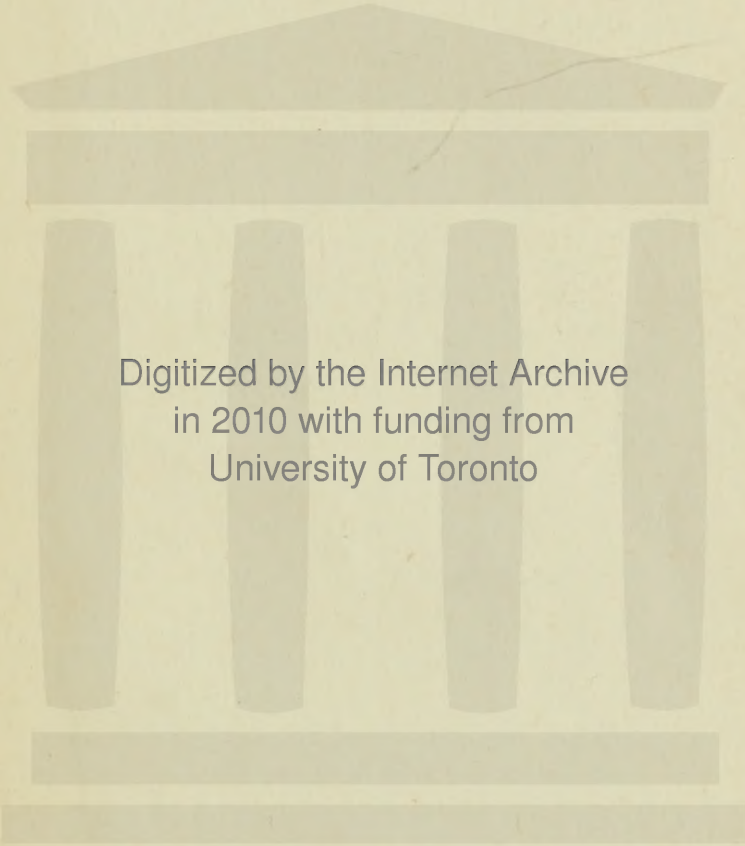
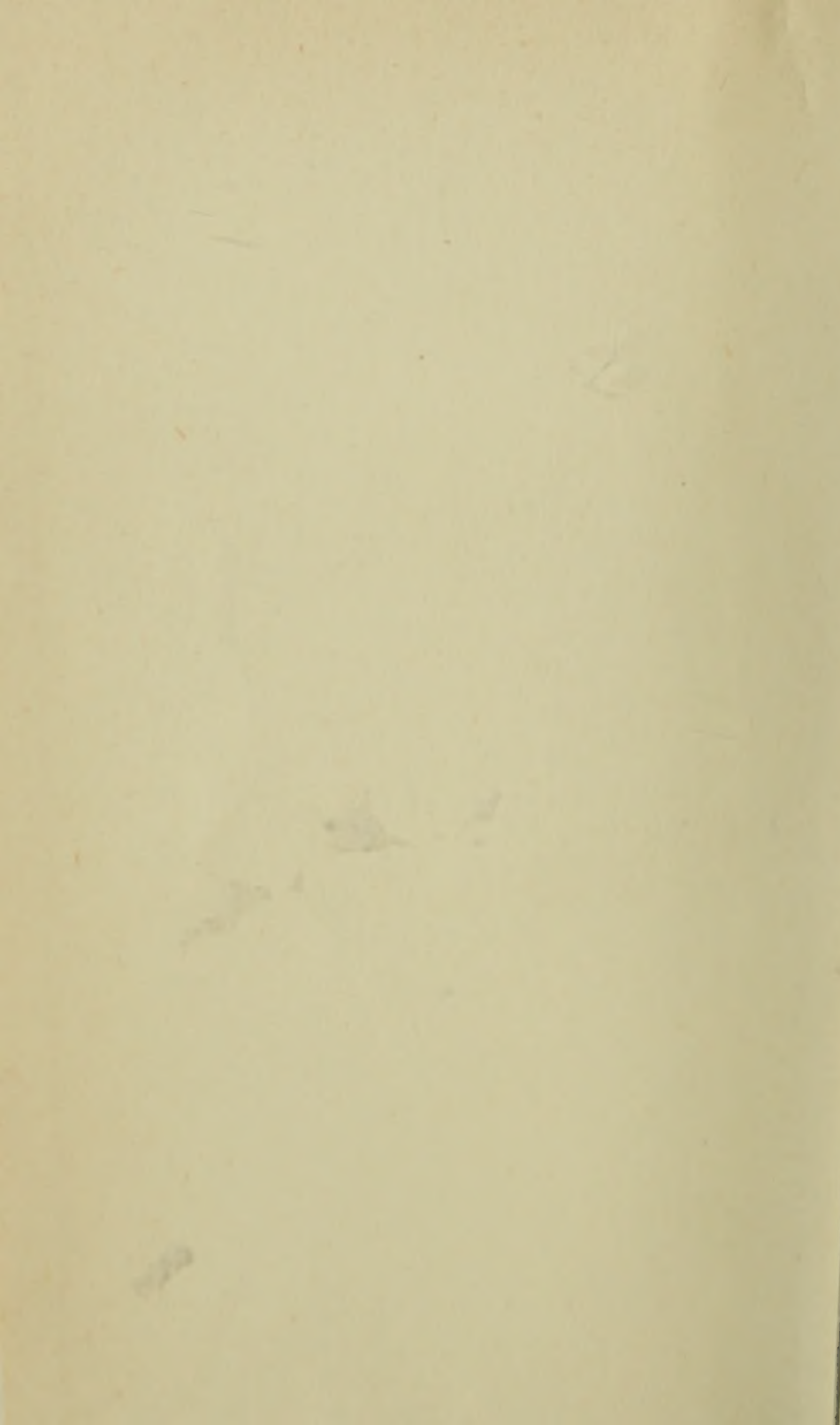




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PREFACE

THIS book, the fourth of a series designed to meet the needs of a Secondary School "four years' course," is intended for use in the year in which the pupils sit for a First Public Examination. In Books I to III the regional and general geography of the world have been covered. There has been no division of the subject into such compartments as physical geography, economic geography, historical geography, etc., nor is this advisable, at least in the teaching of geography up to and including the stage of the First Public Examination. In the opinion of the author the more specialized and detailed teaching of the physical basis of geography, which involves elementary courses on such subjects as geomorphology and meteorology, should be left to the stage of the advanced course. Before this is reached these things are best taught incidentally, and, in the main, their inclusion should be justified by whether or not they are needed in order to supply the physical "background" necessary to explain the life of man.

It is assumed that pupils using this book are familiar with the outlines of world geography. Therefore Part I considers the world in its major natural regions. If the book should be used by those who have not had this preliminary world training, it would be a good plan to delay this part until the end, rather than take it at the beginning.

The rest of the book surveys the regional geography of the continents, giving more attention to those parts which are of greatest importance to British students, *e.g.* the British Isles, Europe, N. America, the monsoon lands of Asia, and the principal parts of the Empire.

It is not intended that it should be thought that the

book contains everything that a student of "Matriculation or Senior School" age should know, nor is it intended that the teacher should take the whole of its contents as the basis of the year's lessons. The pupils must have gained throughout their school course a knowledge of all that is implied by the term "map-reading." Constant use of atlas and other maps, supplemented by well-chosen exercises on contours, etc., will have ensured this. Besides, their previous studies are surely not all forgotten, so that many parts of the world merely need rapid revision. In these cases the book will help the teacher to save valuable time in class.

It is unnecessary to say that the object of this book is not simply to help pupils to pass examinations. It aims at giving a summary of the regional and general geography which should form part of the educational equipment of the boy or girl of sixteen or seventeen years of age. No teacher, however, can object to pupils of this age being required to take an external examination, provided, of course, that the examination is suited to the pupils' capacity and course of study. Moreover, in the author's opinion, the examination taken at this stage (the First School Examination) should require that those sitting for it should have a detailed knowledge of the British Isles, a general knowledge of the world as a whole, and a more detailed knowledge of some, at least, of its more important countries.

In preparing this book the author has been much indebted to the works of the late Prof. Herbertson, to those of Dr. Unstead and Miss Taylor, Dr. Fleure and Prof. Lyde.

Since the greater part of the text was written the author has become an Inspector of Schools under the London County Council. It is necessary for him to state that the Council is in no way responsible for whatever may appear under his name.

L. BROOKS.

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FIG. 1.—The Major Natural Regions of the World. (After Herbertson.)

PART I

THE MAJOR NATURAL REGIONS OF THE WORLD

IN the first three volumes of this series we have surveyed the regions of the world in some detail. We are thus in a position, at the outset of our present studies, to co-ordinate our knowledge by taking the whole world as a great unit, and by dividing it into groups of regions, so that in each group the various regions which comprise it have certain important characteristics that enable them, for our present purpose at least, to be considered together. Incidentally, we shall also be able to revise, and to supplement, our knowledge of general world geography. It is of great importance that we should visualize the world, not as a collection of separate states loosely related to each other, but as a single great organism in which all the various parts have their function to perform, in which each part makes its own peculiar contribution, and in which all act and re-act upon each.

First we must be quite clear what we mean by a *major natural region*. Unfortunately, the present state of scientific geographical knowledge is not sufficiently advanced to enable us to divide the world into groups of regions so that the members of each group so closely resemble each other, not only in all the more important geographical particulars (*e.g.* position, relief and structure, climate and natural vegetation), but also that the cumulative effect of all these factors, as expressed in the human activities, is approximately the same in

4 MAJOR NATURAL REGIONS OF WORLD

each. We cannot do this satisfactorily until students of geographical research have pursued their labours much further than the point they have reached at present. In the meantime we must be content to select certain important factors and to base our classification upon these. In this book the factors selected are those of position, relief, climate and natural vegetation, that is, they are physical factors. Therefore, the term "major natural region," as used in this book, means a large portion of the earth's surface over which the physical conditions are sufficiently uniform to allow the area to be considered as a unit. If several areas have approximately the same characteristics in common we shall group them in the same category.

Now it does not follow that the human conditions (*e. g.* modes of living, occupations, economic activities, etc.) will be the same in all the members of a group, but for our present purpose this is really not a disadvantage, because such differences will compel us to inquire into the reasons why regions apparently similar develop along different lines. In this way we shall be able to estimate the importance of such factors as those of race, type of government and administration, of past history, and of the means of transport and of accessibility.

(I) REGIONS IN HOT LANDS.

We shall now consider the different types of major natural regions to be found in the hot belt of the world, approximately the inter-tropical lands, although these regions extend beyond the actual tropics.

(a) EQUATORIAL TYPES.

The first group of regions comprises the north-west coastal margins of South America, portions of the Amazon and Congo Basins, of the coastlands of West and East Africa and the greater part of the East Indies. To this group of regions we shall give the name *Equatorial Type*.

Let us now discover upon what grounds these regions may be grouped together. In the first place, they are all located in equatorial regions. Because of this the noon elevation of the sun is never very far from the zenith throughout the year, so that the temperature conditions are uniformly high and equable (Figs. 3, 6 and 7).¹ Moreover, it is in this "Doldrums" belt that the upward movement of air caused by the meeting of the trade winds results in rainfall at all seasons (Figs. 14, 15 and 16), although it will be recalled that equatorial lands have

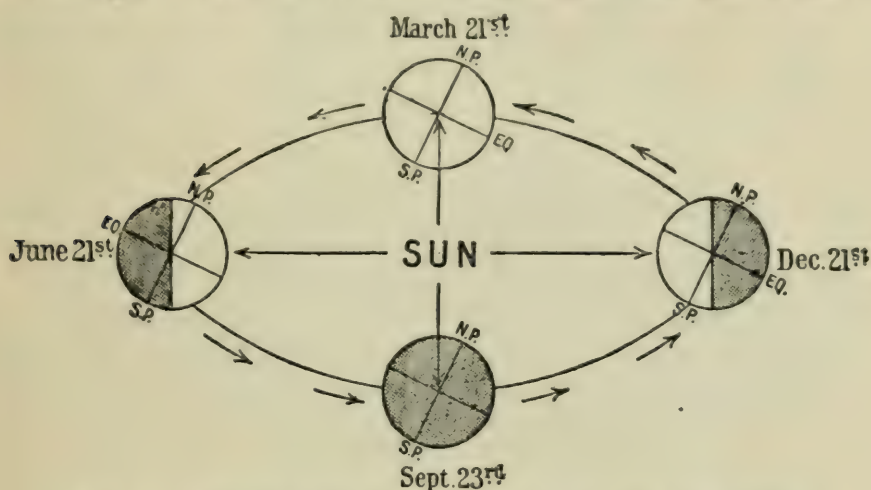


FIG. 2.—Diagram showing the position of the earth with regard to the sun at the equinoxes and solstices.

two relatively wet and two relatively dry seasons, owing to the migration of the belts of pressure and winds, which is in turn produced by the migration of the vertical sun north and south of the Equator. All these climatic factors affect the character of the natural vegetation, which, over the greater part of these regions, consists of equatorial forests, remarkable both for the intense struggle for light and air which goes on within

¹ Maps and diagrams showing the distribution of temperature, pressure, rainfall, natural vegetation, etc., will be found, in their proper sequence, spread out throughout this part of the book. It is intended that they should be referred to constantly in order to check statements made in the text. They are taken from Book III in this series.

6 MAJOR NATURAL REGIONS OF WORLD

them, and also for the great variety of trees and creepers. It is not to be wondered at that where these forests exist in their primeval condition man lives his life on a very low plane and is often little better than, if not quite, a savage. Where the forest has been cleared and agricultural pursuits are followed, the standard of life is much higher.

CLIMATIC STATISTICS ILLUSTRATING TYPES OF REGIONS IN HOT LANDS.

Type of Region.	Name of Place.	Height above Sea Level.	January Temperature.	July Temperature.	Mean Annual Rainfall.	Seasonal Distribution of Rainfall.
I A Equatorial)	Manaos . . .	121 ft.	78° F.	78° F.	86 ins.	} At all seasons.
	Lagos . . .	25	77°	79°	70	
	Equatorville . .	1050	76°	76°	68	
	Mombasa . . .	60	82°	78°	47	
	Batavia . . .	23	78°	78°	71	
	Singapore . . .	10	78°	82°	93	
I B, (Sudan)	Quixeramobim (Brazil)	700 ft.	83° F.	78° F.	23 ins.	} Mainly in summer.
	Kuka . . .	870	71°	83°	20	
	Khartoum . . .	1259	70°	92°	15	
	Tabora . . .	4000	72°	70°	30	
	Daly Waters . .	700	85°	67°	28	
I C (Monsoon)	Rio de Janeiro	224 ft.	79° F.	70° F.	44 ins.	} Mainly in summer.
	Mozambique . .	S. L.	83°	74°	40	
	Bombay . . .	35 ft.	74°	80°	79	
	Calcutta . . .	20	65°	83°	78	
	Port Darwin . .	70	82°	75°	62	
I D (Sahara)	Fort Yuma . . .	1130 ft.	50° F.	90° F.	3 ins.	} Deficient at all seasons.
	Iquique . . .	30	71°	61°	0.2	
	Aswan . . .	360	60°	93°	0	
	Walfish Bay . .	10	66°	59°	0.3	
	Onslow . . . (W. Australia)	S. L.	84°	64°	7	
I E (Ecuador)	Quito . . .	9350 ft.	54° F.	55° F.	44 ins.	} At all seasons. Double maximum.
	Bogota . . .	8725	58°	57°	63	

The Amazon region is truest to type, for there are extensive areas in the Congo Basin where tropical

grasslands are found owing to the prevalence of porous sandstone, while the influence of the mountainous character of the East Indian islands is seen in a greater range of forest types than appears on the equatorial lowland. The influence of the plateau configuration of

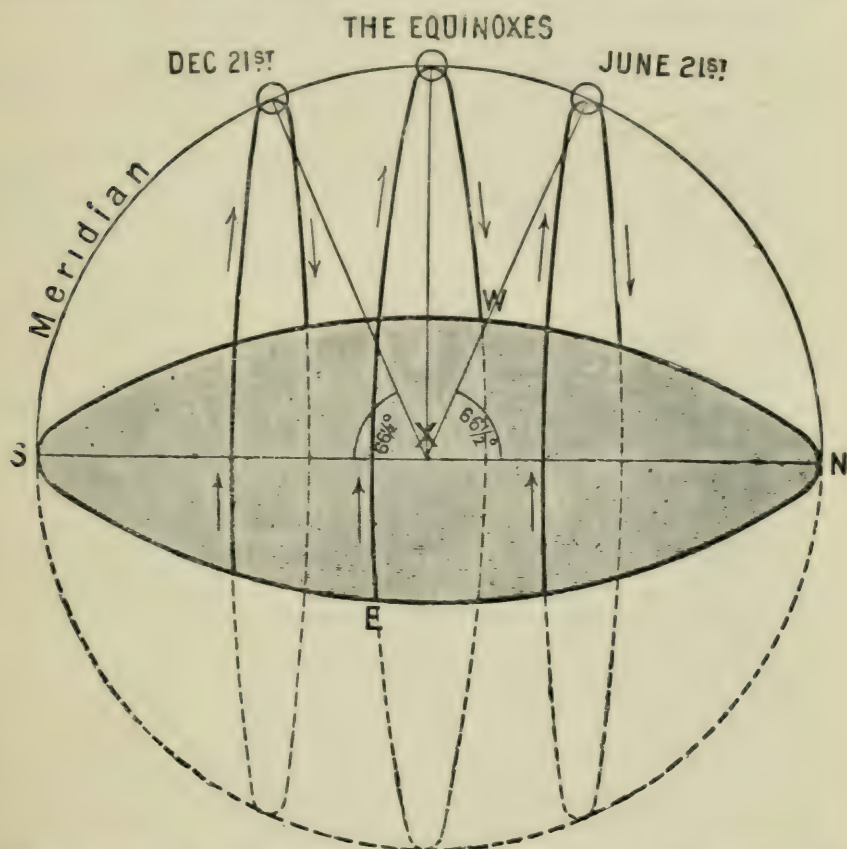


FIG. 3.—The apparent path of the sun at the equator at the solstices and equinoxes. Draw diagrams for (a) London, (b) the North Pole.

central Borneo can be seen in the fact that the prevailing vegetation is tropical grassland.

The denser forests of these regions have been described by Prof. Fleure as *Regions of Debilitation*, where the damp, steaming heat causes man to be degenerate. However, where the forests have been cleared and the cultivation of such tropical products

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as cacao, rubber, rice and sugar have been introduced—a cultivation which it should be noted is all-the-year-round—the region responds with a rich return for the labour expended. Java is an example of what can be accomplished by tropical agriculture developed along scientific lines, and in this respect may be compared with its more backward neighbour, the island of Sumatra. Although Java is less than one-third the size of Sumatra it supports a population nine times as large.

These equatorial regions do very little trade with each other for the obvious reasons that their products are not interchangeable, and also that the inhabitants are easily supplied with all they need from the forests which lie close at hand, but they are rich treasure-houses of raw materials for the great manufacturing countries of the temperate zone. From the Amazon area, rubber is by far the chief product; from the African equatorial lands, rubber, palm oil, copra, cacao, and ivory are exported in huge quantities, while the East Indies supply sugar, coffee, tea and copra.

These products are of such great value and so widely sought after that the ownership of the lands producing them has become a matter of international importance. It is clear that if left to themselves, the natives are not sufficiently advanced to supply the world's needs. Therefore, it appears as though the natives should supply the labour, and the white man the skill in management and organization, for although an increased knowledge of tropical diseases, their causes and prevention, has made it possible for more white men to settle in such lands, white men are in the main birds of passage and not permanent dwellers. Whatever is done, the native should never be exploited for the sole benefit of the white man, as unfortunately he has been in the past, and the product of his labour should be available for the benefit of all mankind.

(b) THE SUDAN TYPE.

The regions we have just discussed lie in the equatorial belt. In passing outwards from these lands in a north and south direction, the amount of the rainfall decreases and the seasonal distribution becomes more marked, until we reach a land where the whole environment differs from that of the forested equatorial lowlands. In Africa such a region stretches across that plateau continent from the Atlantic to Abyssinia. A corresponding region is also found south of the Congo forests, and the two are linked by a very similar region which occupies the plateaus of East Africa (see Fig. 1).

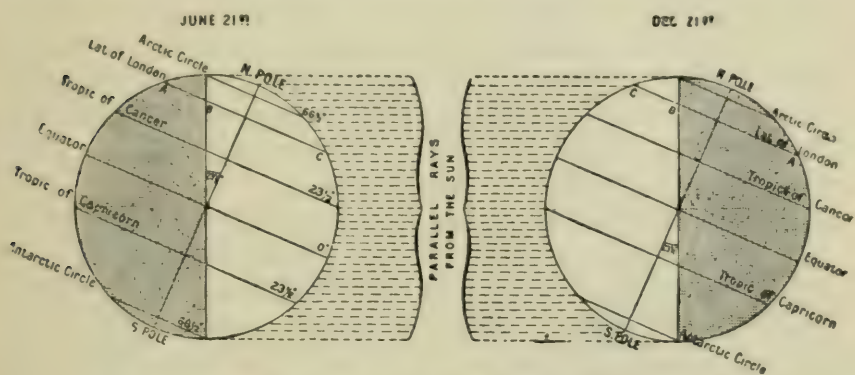


FIG. 4.—The position of the earth with regard to the sun at the solstices.

On a map, we must mark by a line the approximate boundary between the equatorial lands and this second type of region to which we give the name *Sudan*. But it must be realized that in nature it is only very rarely that an abrupt change occurs. One region gradually, almost imperceptibly, changes into another, so that the areas which are really typical of the characteristics of their particular region are separated from each other by a zone which partakes of the nature of both. This is generally true, so that it may be stated that, as a rule, the frontiers of natural regions are zones, not lines.

Now what are the characteristic features of the Sudan type of natural region and which parts of the world

exhibit them? Let us consider the African region which gives its name to the whole group. We have already seen that it lies immediately north of the equatorial forests, that is, it is in the inter-tropical zone. This means that although not far removed from the Equator, there will be some seasonal changes in the distribution of temperature, but certainly not sufficient to give anything like the difference between winter and summer which we are accustomed to experience in the temperate zone. Most of the rain falls during the summer season when the northerly migration of the sun brings the Sudan within the region of low pressure. Although in some places the rainfall is heavy, on the whole it is not enough to keep the ground sufficiently moist at all seasons so as to enable forests to be formed. Therefore, the prevailing vegetation consists of savannahs, or tropical grasslands, except along river-courses or in places where local conditions cause water to be more abundant than usual.

Somewhat similar relief, climatic and vegetation conditions are met with in South America in the regions lying north and south of the Amazon basin, and in northern Australia. The high East African Plateau is, on the whole, rather cooler and drier than the other regions included in this group, but the difference is not so great as to produce a marked change in the physical environment.

The natural occupation in all these tropical grasslands is cattle-rearing, which tends to be nomadic as the deserts are approached. Towards the equatorial forests, owing to the increased rainfall, agricultural occupations predominate and a wide range of products is found. The chief are maize, millet, cotton, sugar and tropical fruits. Thus the Sudan regions include both lands of wandering (the nomadic pastoral lands) and lands where man's effort is met by a ready response on the part of nature. Occasional droughts not only spoil the crops, but tempt the pastoral shepherd to raid the territory of the settled agriculturist, *e. g.* the conquest of the Hausas by the Fulas.

The African Sudan regions are of more importance than the others, and support a far greater population, for the native population of the South American and Australian regions are very small. It is worth while noting, too, that the latter lands had no native domesti-

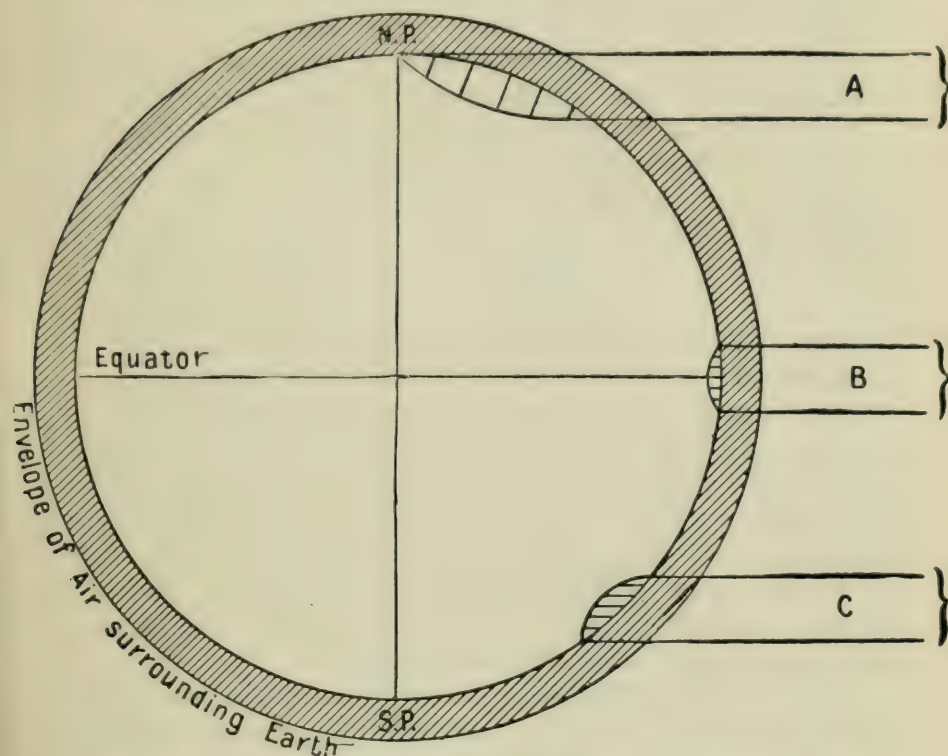


FIG. 5.—Diagram showing bundles of the sun's rays striking the earth's surface at different angles.

cated animals until these were introduced after the lands had been discovered and occupied by Europeans.

(c) THE TROPICAL MONSOON TYPE.

The chief factor which distinguishes these lands from others and makes it possible to place them in one group is that of climate. In some respects they resemble the *Sudan* lands, for both lie within the tropics, and, except where very high mountains or plateaus exist, both are

very hot in summer and very warm or hot in winter. Moreover, both have well-marked dry winters and hot summers during which most of the rain falls. The difference between the two lies partly in the character of the winds and partly in the amount of the rainfall. India, Indo-China and Southern China are the typical monsoon lands. They lie on the margin of a vast land-mass and experience outflowing winds during the dry winter season and inflowing winds during the summer. This is due to the fact that in winter the interior of Asia is very cold and this in turn causes high-pressure conditions to obtain. In summer, when the sun has migrated north of the Equator, the temperatures on the landmass of Asia are very high and result in low pressure. Thus in winter the pressure over the lands is higher than that over the seas, and in summer the pressure over the seas exceeds that over the lands. Air flows from high pressure to low pressure, so that the marginal lands of S.E. Asia have outflowing winds in winter and inflowing winds in summer. These seasonal winds are called monsoons (from an Arab word which means "a season"), although strictly speaking the winter N.E. winds of India are the ordinary trade winds, so that it is the summer S.W. wind for which the designation "monsoon" should be reserved.

The summer inflowing winds have come across vast tracts of ocean (Fig. 10) and liberate very heavy falls of rain on meeting obstructions like the Western Ghats or the Himalayas, but sheltered leeward areas like the Deccan receive much less. On the whole, however, the monsoon regions have a heavier rainfall than the Sudan lands, and have sufficient to keep the soil moist at all seasons, so that extensive forested areas are found. These forests are very different from those of the equatorial lands, owing to the fact that there is a well-marked dry season. They lack the dense tangled character of the equatorial forests and have far less undergrowth.

Very similar climatic and vegetation conditions are found in Central America and the West Indies, along

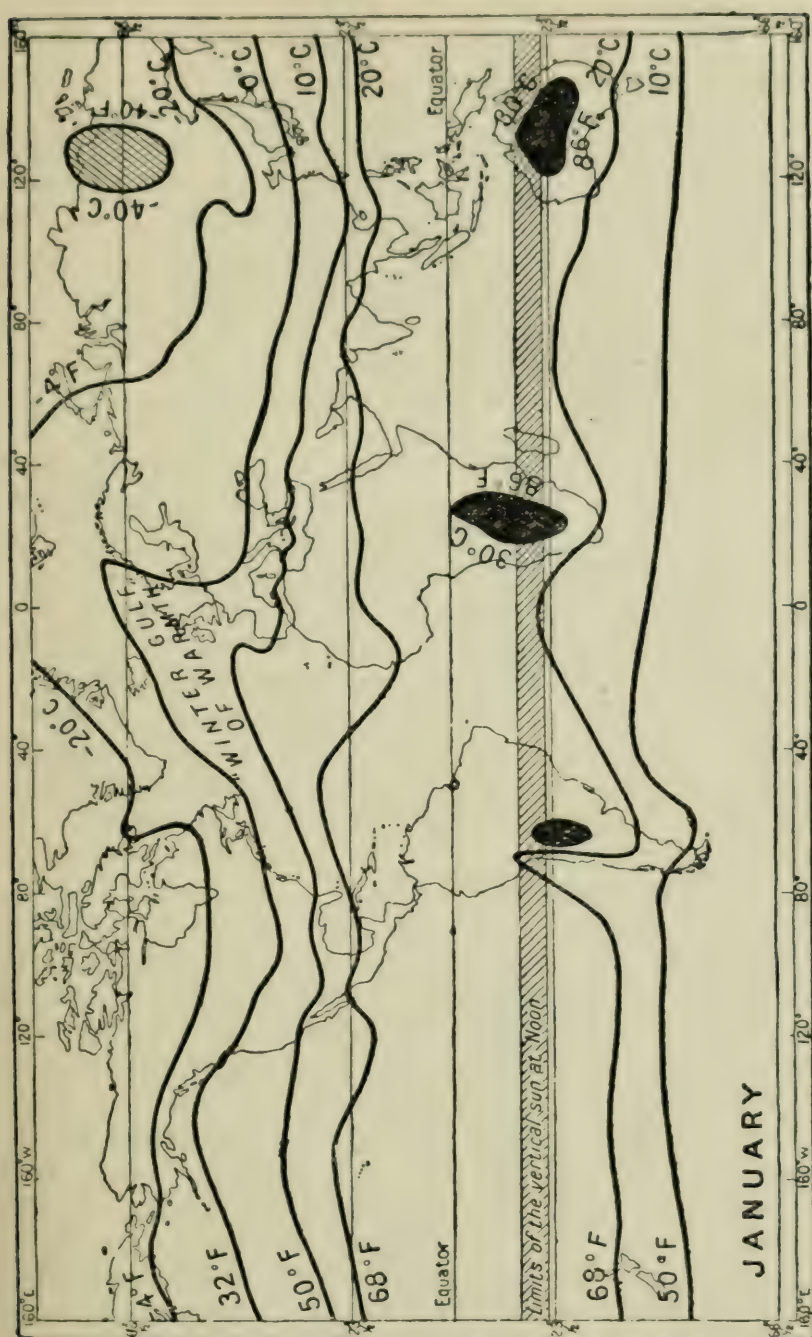


FIG. 6.—Mean sea-level temperatures for January.

the coastal margins of northern South America and eastern Brazil, in Madagascar and the coasts of Africa opposite to that great island, in northern Australia and in certain islands in the East Indies which lie towards their northern and southern limits (Fig. 1). Of course, the natural vegetation and the cultivated products of all these regions are not exactly the same. These lands are widespread over the face of the earth, and the influence of their isolation from each other is naturally to be reflected in their natural vegetation. But, nevertheless, it is very probable that plants found in one of these regions and not in others would do very well if taken there. The great importance of a knowledge of regional geography is thus at once apparent. Many Indian crops have been introduced with considerable success to those parts of Indo-China under the control of France and Britain, whilst most of the cultivated plants now growing in northern Australia have been introduced from outside that continent. The natural and cultivated vegetable products of tropical monsoon lands are so varied—no other regions of the world are so fortunate in this—that it will be best to leave the details of those found in each region for later chapters, but palms, bamboos, hardwoods, rice, maize, sugar and cotton are found in practically all of them.

In world importance the Asiatic regions, with their teeming populations, are easily first. There is a close relationship between the productivity of the soil—especially in the cultivation of rice—and the density of the population. Indeed, monsoon lands must be placed among those regions of the world in which moderate effort on the part of man is met by an abundant response on the part of nature. They may thus be called, or at least their richer parts, *Regions of Increment*. The economic development of Northern Australia is retarded by the "White Australia" policy. The Australian Government is determined to keep the continent for whites. Should the experiment of tropical cultivation by whites succeed, it will be the first example of its kind in the world.

*(d)** THE HOT DESERTS OR SAHARA TYPE.

We have seen that equatorial lands have a heavy rainfall, which is distributed, although unequally, throughout the year. North and south of these lands we have found regions whose rainfall occurs in summer, owing to seasonal migration of the belts of temperature, pressure and winds. Still further north and south the rainfall decreases until regions are reached where rain seldom falls (Fig. 17). These are located round the tropics, and they occur on the western margins of every continent. The prevailing winds of these latitudes are the Trades, which bring moisture to eastern margins, but on western margins they are dry, off-shore winds. Thus, north of the Equator, in the region of the N.E. Trades, on the west of the great landmass of Eurasia and North Africa, we have the combined Sahara and Arabian desert, as well as the small desert of N.W. India, whilst in North America, in similar latitudes, there are the deserts of Colorado and N.W. Mexico. Similarly, south of the equator, on the western margins of each landmass, in the belt where the S.E. Trades predominate, we find the Atacama and Peruvian deserts in South America, the Kalahari desert in South Africa, and the great Australian desert in Australia.

The deserts vary in size, owing to the varying size and shape of the landmasses and to the position of mountain ranges which act as barriers, but they are all alike in being inhospitable to man, except along their margins, where nomadic pastoral tribes are often found, or in those favoured spots where the presence of underground sources of water supply makes settled life, based on agriculture, possible, as in an oasis, or along the banks of a river, as in the case of Egypt. Elsewhere they are barren and generally devoid of vegetation, except after occasional thunderstorms, and man only makes his home there when there is some lure to tempt him, as in the goldfields of the Western Australian desert or the nitrate areas of the South American deserts.

All deserts hinder human intercourse, and in this



FIG. 7.—Mean sea-level temperatures for July.

respect they are often more effective than other natural barriers. The Sahara, which takes a camel caravan three months to cross, has for ages been the barrier between white peoples and everything that is essentially European on the one hand, and black peoples and everything that is African on the other.

(e) ECUADOR TYPE.

This type of region is found in South America in the plateaus of Ecuador and Columbia. It is a special type of tropical region. Owing to the nearness to the Equator, the sun's altitude alters very little throughout the year, so that although the heat is reduced by the high elevation, the mean temperature from day to day is remarkably even, and the climate has been described as one of perpetual spring. It would, however, be a mistake to think of it in terms of an English spring. These conditions obtain at the elevation at which the chief towns and settlements are located (see "Climatic Statistics," on p. 6), but at higher elevations the conditions become very extreme, whilst even in such places as Quito the evenings are frequently very cold, although frosts are exceedingly rare.

Few trees are found, but wheat and barley, as well as other temperate cereals and vegetable products, are cultivated. In some parts maize is also grown, for the mean temperature of the afternoons is higher than that for the whole day, and is generally sufficient for maize. Unfortunately, however, the cereals do not always ripen, whilst the total amount produced is never sufficient to support the inhabitants. Cattle- and sheep-rearing is also an important occupation.

(2) REGIONS IN WARM TEMPERATE LANDS.

Between the equatorial lands to the south and the polar lands to the north, are the lands of the temperate zone. Partly owing to its extent in latitude, which causes considerable differences in the amount of heat

received from the sun, and partly on account of the differences in the seasonal distribution of rainfall, caused by the location of the southern part of the belt within the zone affected by the sun's migration, the temperate zone must be divided into two, a northern cool temperate belt, and a southern warm temperate belt. In this chapter we shall confine our attention to the latter.

Fig. 1 shows that the warm temperate belts stretch from east to west across all the continents. Within these belts there are at least four well-defined types of natural regions. To these we shall now turn our attention.

(a) THE MEDITERRANEAN TYPE.

The determining physical factors which make it possible to group into one class the various regions of this type (see Fig. 1) are those of position and climate. All these regions are on the western margins of their respective landmasses. The lands bordering the Mediterranean Sea may not, at first sight, appear to conform with this, but in this case two points must be borne in mind. The enormous landmass of Europe, Asia, and North Africa must be taken together, while the great size of the Mediterranean Sea itself—it is the world's greatest inland sea—causes oceanic influences to be felt far inland. The climatic resemblances are due to the location of all these regions in those latitudes (approximately the 30's N. and S. of the Equator) which are in the transition area between those lands having the prevailing westerlies at all seasons and those over which the prevailing winds are the Trades.

The western marginal lands lying within these transition zones come under low-pressure conditions in winter and high-pressure conditions in summer. This is due to the migration of the belts of pressure and winds, which, as a general rule, move northwards in the northern summer and southwards in the southern summer, owing to the migration of the temperature belts, due in turn to the apparent migration of the sun (see Figs. 4 and 17). It will readily be seen that with this seasonal change of

REGIONS IN WARM TEMPERATE LANDS 19

winds, the winters, when low-pressure conditions with prevailing westerly winds obtain, will be wet, and the summers, when high-pressure calms or easterly trades prevail, will be dry. The temperature is higher all the year round than in Britain. This type is therefore one of mild, wet winters, and very warm, dry summers.

CLIMATIC STATISTICS ILLUSTRATING TYPES OF REGIONS IN THE WARM TEMPERATE ZONE.

Type of Region.	Name of Place.	Height above Sea Level.	Mean January Temperature.	Mean July Temperature.	Mean Annual Rainfall.	Seasonal Distribution of Rainfall.
2 A (Mediterranean Type)	San Francisco	60 ft.	50° F.	58° F.	24 ins.	} Wet winters. Dry summers.
	Valparaiso .	135	63°	53°	24	
	Palermo .	220	51°	76°	30	
	Algiers .	75	54°	77°	27	
	Cape Town .	38	70°	54°	25	
	Perth (W.A.)	47	76°	55°	33	
2 B (China Type)	Savannah .	118 ft.	50° F.	80° F.	51 ins.	} No season of drought. Most rain falls in summer months.
	Monte Video	40	73°	52°	45	
	Durban .	250	77°	64°	42	
	Shanghai .	S.L.	38°	82°	46	
	Sydney .	150	72°	52°	50	
	(N.S.W.)					
2 C (Turan Type)	Cheyenne .	6100 ft.	26° F.	68° F.	13 ins.	} Most rain falls in summer.
	Bismarck .	1680	8°	70°	19	
	Cordoba .	1450	73°	50°	28	
	Astrakhan .	50	19°	78°	6	
	Bourke .	450	84°	51°	17	
2 D (Iran Type)	Salt Lake City .	4350 ft.	29° F.	76° F.	16 ins.	} Most rain falls in summer.
	Johannesburg	6300	68°	47°	31	
	Kimberley .	4050	75°	48°	18	
	Bloemfontein	4550	73°	46°	23	
	Teheran .	3800	34°	86°	10	
	Isfahan .	5350	32°	82°	5	
	Kashgar .	4035	22°	80°	2	
	Urga .	3800	15°	63°	8	

The influence of climate is clearly seen in the characteristic vegetation of these lands, for the plants must be such as are adapted to withstand the summer

drought. Most of them are evergreens with small, tough-skinned leaves and deep-striking roots, whilst many are aromatic and exude juices which varnish the leaves and check transpiration during the dry months. Where the rainfall is sufficient, forests of walnut, chest-

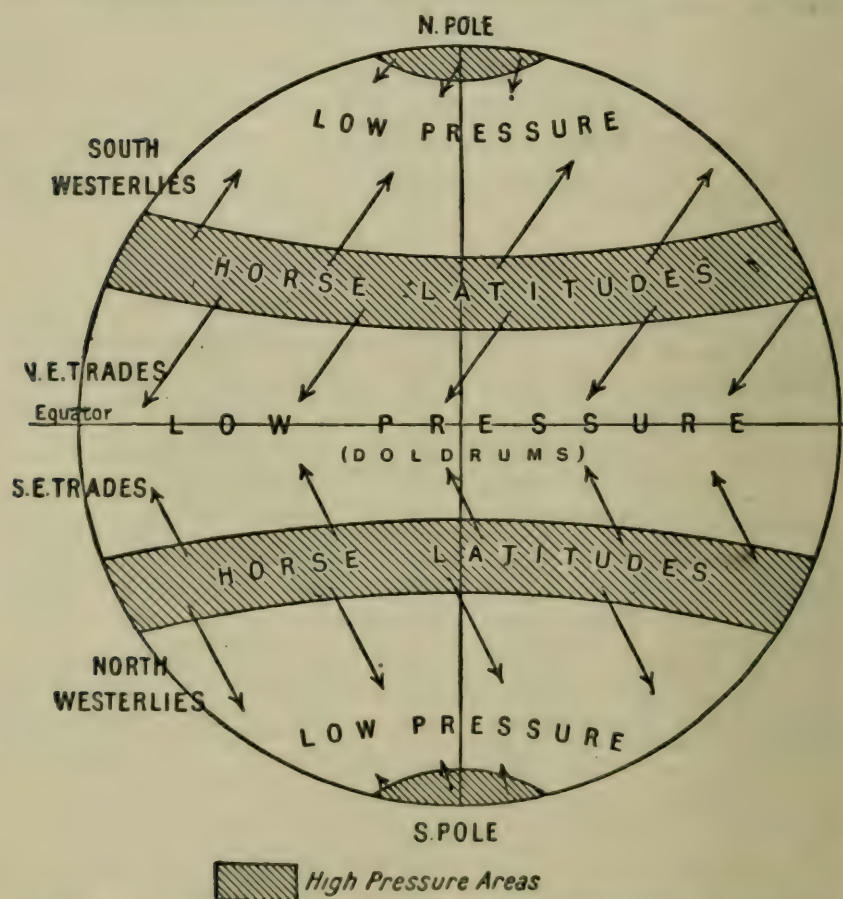


FIG. 8.—Diagrammatic representation of the prevailing winds of the world.

nut, and evergreen oak (including the cork oak) are found. Natural pasture lands are very uncommon, the place of grasses being taken by small dry bushes and flowering herbs. The Mediterranean landscape is thus at its brightest and greenest in winter, since drought prevails in summer, when most plants are

resting. The driest areas almost approach to desert conditions.

The cultivated plants of Mediterranean lands are very important, and naturally are of the type suited for long, dry, sunny summers; *e.g.* the luscious fruits. As a general rule, however, irrigation is necessary for summer crops. The chief fruits are olives, mulberries, grapes, oranges, lemons, figs, and apricots, while wheat, maize, rice, tobacco and cotton are also found. Based upon these products are such industries as soap-making (olives), silk manufacturing (mulberries), wine-making (grapes), and fruit packing and canning.

Of course all these vegetable products are not of equal importance in all the lands of this type, but it is worth while noting that considerable success has rewarded such experiments as the introduction of European vines to California and Australia, and that much more work of a similar nature could be attempted. Wine and fruits are among the principal products of every one of the "Mediterranean" regions.

Mediterranean lands have been described as *Regions of Increment*, that is, like the tropical monsoon regions, they are lands in which moderate effort on the part of man meets with a quick and certain reward on the part of nature. This does not mean that every square mile of the land shown on Fig. 1 as of this type is a land of increment, but simply that within each region there are to be found rich areas of corn and fruit land, *e.g.* Andalusia, Tuscany and parts of the Valley of California, where man does not spend all his energy in supporting himself, but has leisure time to think, to practise arts and crafts, and thus to advance in civilization. It is no accident that in such lands the early civilizations of Greece and Rome appeared. One final point is worth mentioning, and that is that all these Mediterranean lands except Mesopotamia (*i.e.* the Mediterranean area itself, California, Central Chile, S.W. Cape of Good Hope, S.W. Australia, and the North Island of New Zealand) are peopled by Europeans, or by people of European descent. Mesopotamia may be

classified with the hot deserts quite as well as with this group. As it does receive some winter rainfall, and by irrigation methods produces all the typical Mediterranean products, it has been included in the present category. It must, however, be thought of as a very dry type of Mediterranean land

(b) THE CHINA TYPE.

We should expect to find that the eastern marginal lands of the warm temperate belt are very different from the western margins just described, because, although a west wind would probably be a rain-bearing wind on the west, it would be a dry land wind on the east, and *vice versa* in the case of an east wind. On the whole the climate tends towards extremes, especially in the case of Northern and Central China, where, considering the latitude, winters are extraordinarily cold. This is due to the cold winter winds which flow outwards from the vast landmass of the interior of Asia. Lands of this type have no marked season of drought, as is the case with Mediterranean lands, but the rainiest season is summer, when winds tend to in-flow from sea to land. It will thus be seen that these warm temperate eastern marginal lands really have a temperate monsoon climate.

The occurrence of the heaviest rains in the season of greatest heat, *i.e.* summer, ensures an abundant natural vegetation. Most of these regions were formerly forest covered with such broad-leaved trees as oaks, beeches, walnuts and magnolias, together with much undergrowth of evergreens resembling the bushes found in Mediterranean regions, *e.g.* plants of the laurel type. A wide range of cultivated plants is also found, and this helps to make these regions some of the world's greatest agricultural areas. In S.E. United States, cotton, sugar, rice, and tobacco are the chief crops, while in addition to these, tea and silk (mulberries) are important in China and Japan. Many of these crops are cultivated successfully in the three regions of the

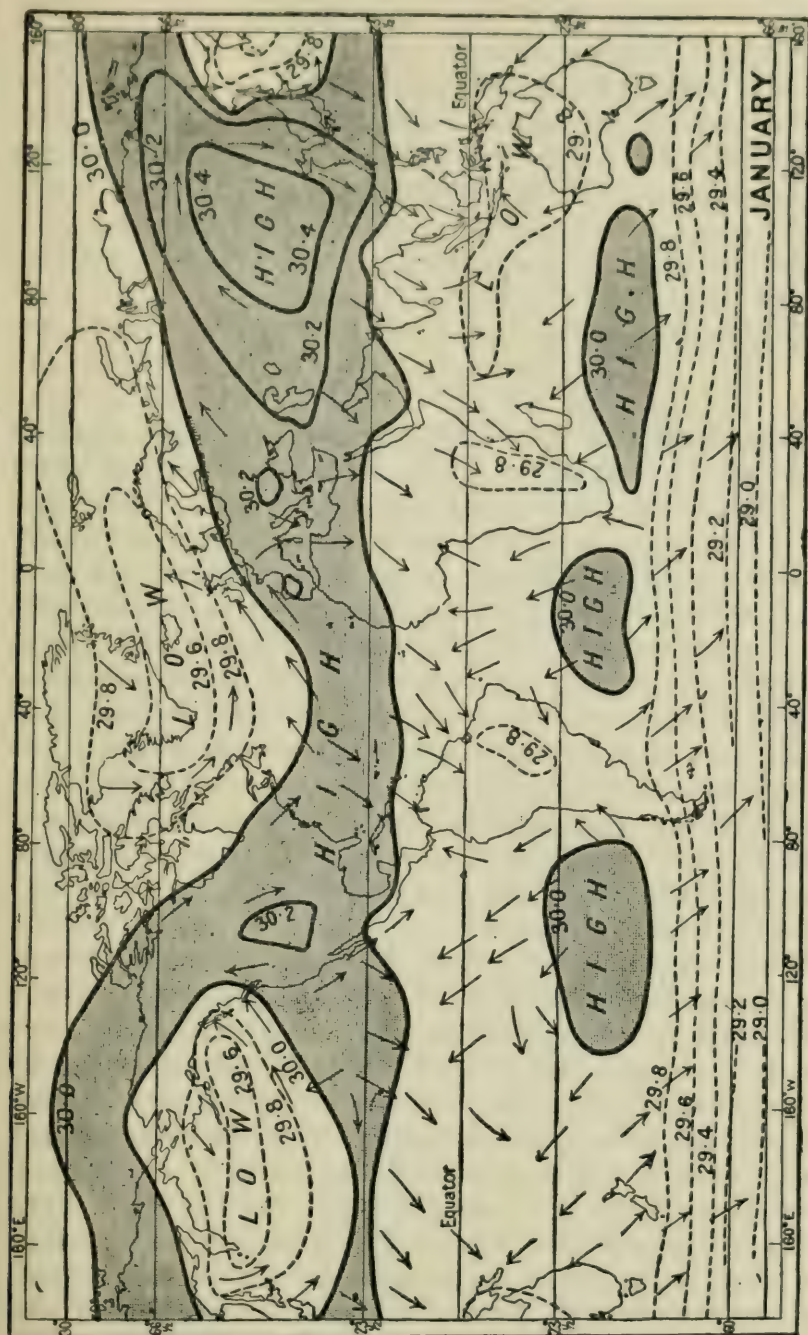


FIG. 9.—Isobars and winds for January. (After Buchan.)

Southern Hemisphere belonging to this type, *e.g.* S.E. Brazil and Uruguay, Natal, and the eastern part of the Cape of Good Hope, and the coastal margins of New South Wales and southern Queensland. It should be noted that these southern regions differ from the two northern areas in having milder winters. They are also much smaller in extent, partly owing to relief, and partly to the southward tapering of the southern continents.

(c) THE TURAN TYPE.

Regions of this type are interior lowlands situated in the warm temperate belt. The term lowland must be interpreted liberally so as to include the "high plains" east of the Rockies and the Andes. The type obtains its name from the interior lowlands of Eurasia, which stretch from the Caspian and Aral Seas to the mountain barrier of Central Asia. In North America we find comparable lands west of the 100th meridian west of Greenwich, which, as a glance at a rainfall map will show, closely coincides with the isohyet of 20 inches, and extending westwards to the Rockies. In the Southern Hemisphere, most of the lands east of the Parana in South America, and the lowlands of the Murray-Darling basin in Australia exhibit the characteristics of the Turan type.

What are these characteristics? As we have already seen, there is a similarity of position. All are interior lands, and, in the main, lowlands. Therefore the climate will be extreme, the greater the landmass, the greater the extremes. Thus the climatic statistics show greater differences between winter and summer temperatures in the Northern Hemisphere regions than in those of South America and Australia. The rainfall maps show that most of the rain falls in the summer, and also that the total precipitation can rarely be described as more than scanty. In many cases it is deficient. This distribution of rainfall is due to the fact that over great landmasses high-pressure conditions prevail in winter

and low-pressure in summer. This results in a predominance of outflowing winter and inflowing summer winds, that is, in most of the rain falling in the summer. The smallness of the amount is in most cases due to the distance the winds have to travel before reaching the interior lands, together with the presence of mountain barriers which compel the inflowing winds to deposit some of their moisture before reaching the interior. According to the amount of their rainfall, these "Turan" lands are clothed with rich grasses or with poor grass and thorny scrub.

The natural occupation is the pasturing of cattle, sheep, horses, and goats, and this is the chief industry in all four regions. In its beginnings the people following this industry were nomads who wandered from place to place with their flocks and herds.

Most of the better-watered areas have now been appropriated for the cultivation of cereals such as maize, wheat and barley, although in most cases irrigation is necessary to supplement the scanty rainfall. Even in some of the drier parts, scientific knowledge has been brought to bear, and settled pastoral or agricultural pursuits have been made possible by the sinking of deeper wells, and by the introduction of irrigation methods which utilize water brought, perhaps, from distant mountains. Thus the nomad is being steadily pushed outwards from the best lands towards the desert or its margins.

In the Old World these interior lowlands are so dry as to be little better than desert, except where water is supplied by a river or a well. Thus cities like Bokhara and Samarkand are really fertile oases where existence is entirely dependent upon water brought from far-away mountains by rivers. But such places are little "regions of increment," where cereals, Mediterranean fruits and cotton grow in profusion. Similar spots are found in the other regions, *e.g.* the irrigated areas of Denver, Mendoza, and Mildura.

The Old-World nomad lands have had a profound influence upon history. It would appear as though

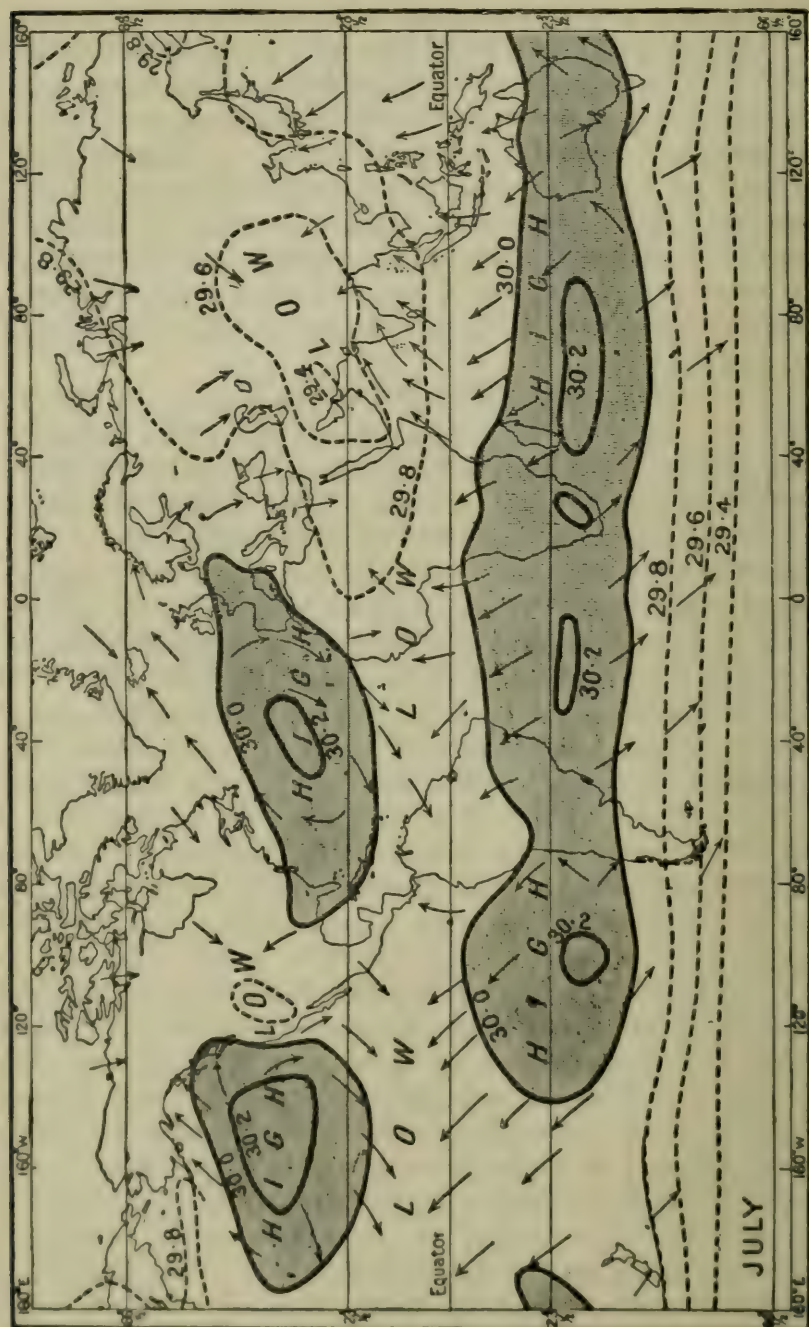


FIG. 10.—Isobars and winds for July. (After Buchan.)

from time to time, at certain long-separated intervals, the climatic conditions have changed, and these interior lowlands have become drier and thus unable to support their populations. At such times they have sent waves of invasion into the more settled lands. We have only to think of the Magyars of Hungary, the Turks of Anatolia and Europe, the Mongols of China and the Rajputs of India to see what these dry grasslands have done. Such large-scale irrigations are, indeed, characteristic of most "lands of wandering."

(d) THE IRAN TYPE.

The high interior plateau of Central Mexico and Western United States, the high veldt of S.E. Africa, and the combined plateaus of Asia Minor, Armenia, Kurdistan and Iran (the latter comprises Persia, Afghanistan and Baluchistan) belong to this type of natural region. The first and the third are plateaus lying between great chains of folded mountains, and therefore are enclosed by higher marginal mountain ranges. The second lies on the top of the great plateau coastal block of South Africa, and is not enclosed by mountain chains rising far above the general level of the plateau. The climate of these regions is extreme, but on account of the differences just stated, more pronounced in the American and Asiatic regions than in S.E. Africa. As in the case of the interior lowlands of the Turan type, and for the same reasons, the rainfall tends to be scanty and to be confined chiefly to the summer months. The natural vegetation (rich grassland, poor grassland or scrub according to rainfall) resembles that of the Turan lowlands, but in the case of the two more enclosed regions the prevailing conditions are those of semi-desert, except when rivers bring water from snow-clad mountain, or where man has undertaken the work of artificial irrigation, as in the rich lands of Salt Lake City or Mexico City. In South Africa the belt nearest the coastal scarps of the Drakensburgs has sufficient rain for permanent pasture, but as one travels in a

westward direction the vegetation changes through poor grasses, scrub and semi-desert to the arid wastes of the Kalahari.

The chief occupations also much resemble those of the "Turan" lands. In South Africa the richer lands are ploughed and produce cereals. They also support great herds of cattle and horses and countless flocks of sheep. In Africa and Asia the poorer grasslands support scattered families of pastoral nomads.

We have included the plateaus of the Tarim basin and of Mongolia in this group (see Fig. 1). Certain differences, however, must be noted between them and the regions described above. Both have much colder winters than the other regions (see the figures for Kashgar and Urga on p. 19). They are also much drier. These differences are due to their position nearer to the heart of the Asiatic landmass, and therefore further from the moderating influence of the ocean.

Bearing in mind that the influence of these climatic factors will be seen in the greater aridity of the Mongolian and Tarim plateaus compared with the other regions included in the general heading "Iran Type," it is not necessary to add more to what has been stated above.

(3) REGIONS IN COOL TEMPERATE LANDS.

The cool temperate lands have the warm temperate belt on their equatorward side and the northern forests on their poleward side. Owing to the unequal distribution of land between the Northern and Southern Hemispheres and to the southerly narrowing of the continents of the latter hemisphere, most of the cool temperate lands are in the Northern Hemisphere, where they occupy a great belt stretching across North America and Asia (see Fig. 1).

We shall find that they fall into the same four categories as the warm temperate lands, *i.e.* western and eastern margins, interior lowlands and highlands.

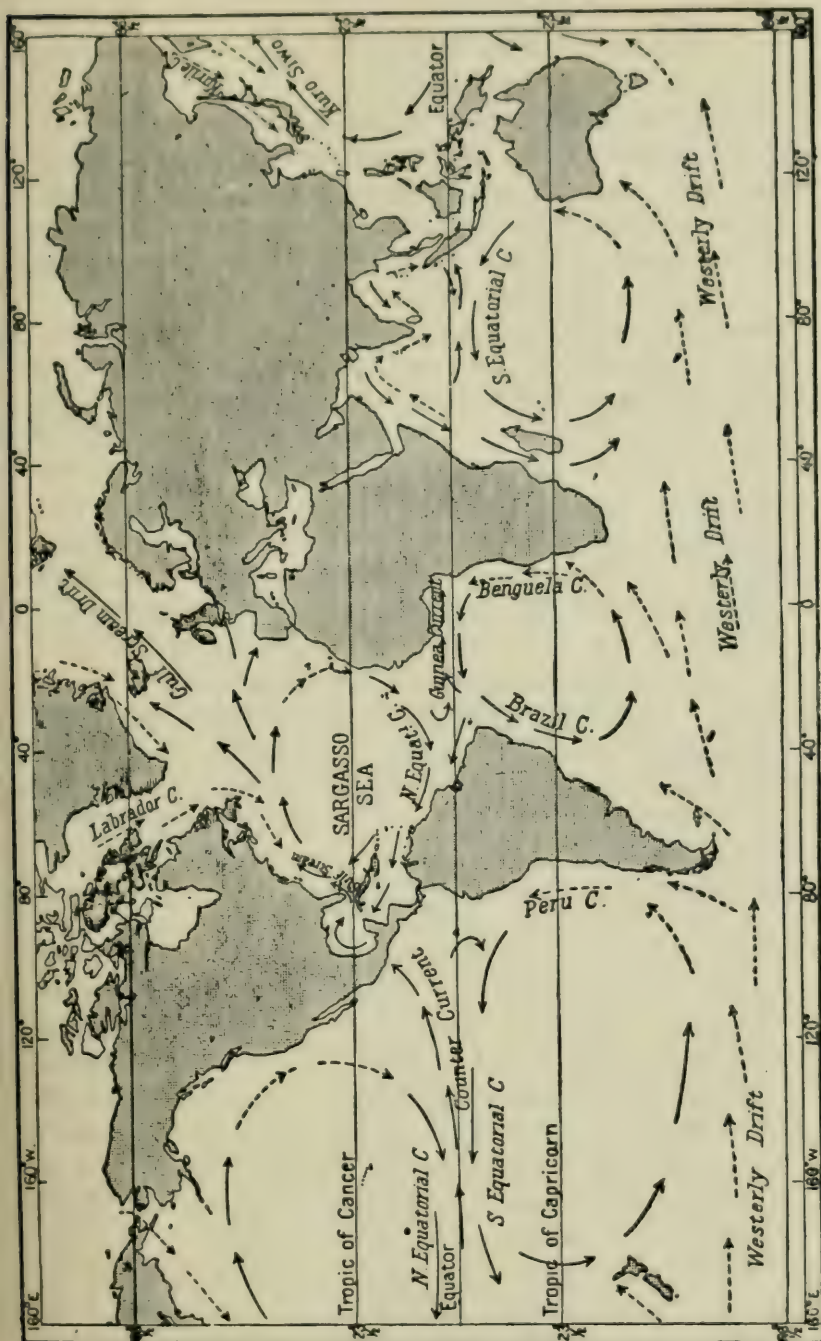


FIG. 11.—Ocean currents. The dotted arrows in the N. Indian Ocean show the currents during the S.W. Monsoon, the other arrows those during the season of the N.E. Trades. Elsewhere on the map the dotted arrows show relatively cold currents, the others relatively warm currents.

30 MAJOR NATURAL REGIONS OF WORLD

(a) THE WEST EUROPEAN TYPE.

Fig. 1 shows that regions of this type are to be found on the western margins of all the continents in those latitudes where the seasons are well marked and where the prevailing winds at all seasons are the

CLIMATIC STATISTICS OF REGIONS IN COOL TEMPERATE LANDS.

Type of Region.	Name of Place.	Height above Sea Level.	Mean January Temperature.	Mean July Temperature.	Mean Annual Rainfall.	Seasonal Distribution of the Rainfall.
3 A (West European Type)	Victoria, B.C.	S.L.	38° F.	60° F.	38 ins.	At all seasons, but usually most in winter.
	Valdivia .	50 ft.	61°	45°	106	
	Valentia .	16	45°	58°	60	
	Bergen .	50	34°	58°	68	
	Corunna .	90	48°	64°	65	
	Hobart .	165	62°	46°	24	
	Hokitika, N.Z. .	S.L.	60°	45°	115	
3 B (St. Lawrence Type)	Halifax, N.S.	120 ft.	22° F.	63° F.	55 ins.	At all seasons, but usually most in summer.
	Montreal .	185	13°	70°	39	
	Vladivostok .	60	-7°	67°	15	
	Hakodate .	20	27°	70°	44	
3a—C (Central European Type)	Stockholm .	150 ft.	27° F.	62° F.	16 ins.	At all seasons with summer maximum.
	Petrograd .	20	17°	63°	17	
	Vienna .	650	29°	67°	23	
	Belgrade .	450	29°	72°	24	
3 C (Prairie Type)	Calgary .	3,400 ft.	12° F.	60°	15 ins.	Most rain falls in summer.
	Winnipeg .	760	-7°	66°	22	
	Barnaul .	475	-2°	67°	12	
	(W. Siberia)					
	Odessa .	200	25°	73°	16	
	Harbin .	520	-2°	72°	19	
3 D (Interior Highland Type)	Kamloops, B.C. .	1,200 ft.	25° F.	69° F.	11 ins.	Most rain falls in summer.
	Helena .	4,150	20°	68°	13	
	Irkutsk .	1,600	-5°	65°	14	
3 E (Tibet Type)	Lah .	11,500 ft.	19° F.	64° F.	1 ins.	Most rain falls in summer.
	Lhasa .	11,900	27°	65°	15	
	La Paz .	12,100	52°	45°	21	

westerlies. It is because of this position with reference to prevailing winds which have crossed wide expanses of ocean that such lands have an equable and temperate climate with rain at all seasons (see table of climatic figures). It is in this case almost entirely because of this climatic similarity that Western Europe, from northern Norway to the Cantabrians, the N.W. coast margins of North America, Southern Chile, Tasmania, and the South Island of New Zealand may be placed in one category. If a physical map is examined carefully we shall see at once that there are considerable physical differences between these areas. The plains of Britain, Northern France, Holland, Belgium and Western Germany are not repeated elsewhere. On the other hand, there is a marked similarity between the configuration of western British Columbia and that of western Scandinavia, whilst coasts of the "fiord" type are found in every one of the regions mentioned. But the chief differences between these regions, which climatically are closely comparable, are due to the fact that the Western European region has behind it a long human history. Man has there very considerably modified his environment, whereas to all the other regions civilized man is a comparatively recent comer.

Despite these differences the climatic resemblances are sufficient to warrant our grouping these regions and of thinking of them together, provided that we do not shut our eyes to those things in which they differ. This comment, of course, applies to all the groups we have considered. On account of the climatic resemblances there is a fairly close likeness between the natural vegetation and the chief cultivated products, that is, if we remember that we must make allowance for physical differences of relief. We must also bear in mind that in Western Europe the virgin forest only exists in samples. Broad-leaved trees (oaks, beeches, elms, etc.), which resist the winter cold by shedding their leaves in the autumn, are found in the lowlands, while conifers (pines, firs, etc.), whose needle-shaped leaves enable them to withstand the severe winter,

usually occupy the higher lands. Where forests have been cleared and agriculture is engaged in, wheat, oats, barley, root crops (potatoes are the chief), hemp and flax are the commonest products, but extensive areas are also devoted to the rearing of cattle and sheep, and much mixed farming is carried on.

The indented coasts of all these regions, together with the extensive sinking which has produced continental shelves of varying widths, have also provided

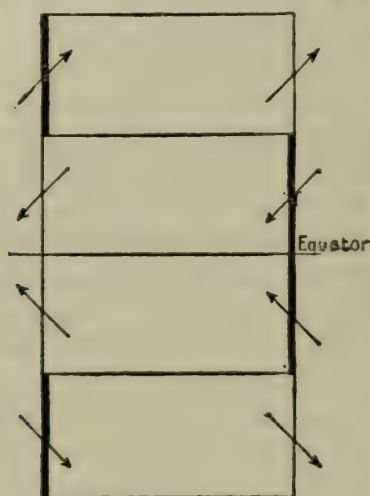


FIG. 12.—This diagram illustrates the piling up of waters by on-shore winds.

the natural conditions favourable to the development of fishing industries.

(b) ST. LAWRENCE TYPE.

This group derives its name from the Eastern Canadian region, the best-known member of the group (see Fig. 1). Since they lie on the eastern margins of their respective landmasses, they differ very considerably from the western marginal lands just described. This is evident if the climatic statistics for the two types (see p. 30) are compared. The winters of the eastern margins are much colder and the summers slightly

warmer, so that, as far as temperature is concerned, we may describe the conditions as being moderately extreme. The mean annual rainfall of eastern margins is also less (see Fig. 14), whilst summer is normally the season of most rain, although some does fall at all seasons. The causes underlying these climatic conditions somewhat resemble those already discussed in connection with monsoon regions and the eastern margins of warm temperate lands. In the north temperate zone, as will be seen from a study of Figs. 9 and 10, we find high pressure over the landmasses and low pressure over the oceans in January, and the reverse of these conditions in July. The result of this is seen in the general tendency towards outflowing land winds in winter and inflowing sea winds in summer. This, of course, accounts for the climatic facts stated above.

The greater cold of eastern margins compared with western margins is clearly shown by the winter freezing of rivers and harbours, except on the southern margins. The ports on the estuary of the St. Lawrence are frozen, so are the coasts of eastern Siberia, *e.g.* Vladivostok is ice-bound in winter, but Halifax, N.S., and Port Arthur are ice-free. On the western margins in the same latitudes the harbours are accessible all the year round. The chief reason for these differences is illustrated by Fig. 12, which shows that western margins receive the prevailing westerlies of this latitude as on-shore winds. Now winds are the chief cause of those movements of the surface water of the ocean which we call ocean currents. Fig. 12 shows that the warm surface-waters are pushed by the prevailing winds towards the western margins of cool temperate lands where there is, in effect, a piling up of warm water. Thus the warm winds, together with the warm water of the drift currents which they set in being, have a marked influence upon the climate of western margins and upon the accessibility of ports. On the other hand, the westerlies are off-shore winds on eastern margins and assist in carrying the warm ocean surface water away from the coast. Add to this the fact that

flowing past the shores of eastern Canada and eastern Siberia are the cold Labrador and Kurile stream currents (see Fig. 11), which must exert some influence in cooling any air-currents passing over them on their way to the land, and we shall have little difficulty in accounting for the marked contrasts between British Columbia and Western Europe on the one hand, and Labrador and Eastern Siberia on the other.

The climatic differences between western and eastern margins are reflected in the natural vegetation, for in the latter lands coniferous forests are much more in evidence (see Fig. 18). In both eastern North America and eastern Asia the forests form one of the chief sources of wealth, but there are considerable economic differences between the two regions due to the fact that in North America

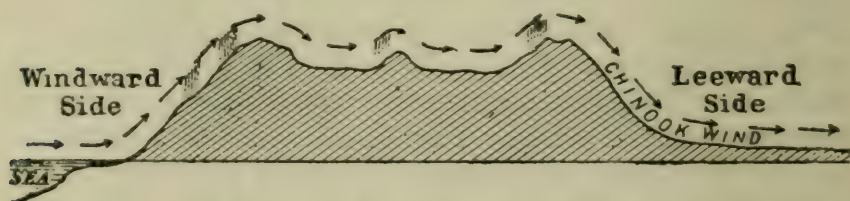


FIG. 13.—The Chinook or Föhn wind.

large areas of forest have been cut down and pastoral and agricultural occupations are carried on in the clearings, whilst in Eastern Siberia even lumbering is comparatively unimportant and the forests are inhabited by hunting tribes, just as the American forests were formerly inhabited by Indian hunters and trappers.

In the Southern Hemisphere the only lands of this type are to be found in Southern Argentina, although in this case the narrowness of the continent and the presence of the Andes on the windward side are factors which help to make the region not only less extreme in climate, but also drier than the two regions already discussed. Instead of forest the natural vegetation is of a steppe character wherever there is sufficient moisture; but considerable areas are so dry, owing to winds of the Chinook type (see Fig. 13) which descend from the

Andes, that they are little better than desert and semi-desert. In most parts agriculture is not possible without irrigation. Indeed it will be seen that, in some respects, they closely resemble interior lowlands.

We have spoken of Mediterranean lands as "regions of increment" and Equatorial forest lands as "regions of debilitation" (see pp. 21 and 7). If we wish to give a name to these western and eastern margins of cool temperate lands—a name which expresses the response the regions give to human work—we can call them *Regions of Effort*. They are not alone in meriting this title, and there will be no difficulty in suggesting other regions to which the name may be applied. They are regions of effort because in such lands man must put forth much labour before he can receive increment or reward. Reward does come, but only after the putting forth of much effort. Incidentally we must note that it is in just such lands that we find the most important and the most progressive nations of modern times.

(c) THE PRAIRIE TYPE.

There are no large regions of this type in the Southern Hemisphere, since they are only found in cool, temperate latitudes in the interior of great landmasses. One region occupies the interior lowlands of Canada and northern United States, another the vast lowland area which extends from Central Europe to the highlands of Eastern Siberia, and a third and smaller region, the almost enclosed lowlands of Manchuria.

In all these, for reasons with which we are already familiar, the climate is extreme, the winters are long and severe and the summers very warm (see "Climatic Statistics" on p. 30). On the whole, the rainfall, most of which occurs in summer, is not very heavy, and becomes less and less towards the Rockies in North America, and as one goes eastward in the central lowlands of Eurasia. This is because distance is being increased from that ocean from which the winds derive the greater part of their moisture.

Because the heat and the rain come at the same season, and because the rain is on the whole insufficient for the growth of trees, the natural vegetation of these interior lowlands is grassland, called prairies in North America and steppes in Russia. Climatic factors do not entirely govern the kind of natural vegetation, for there are parts of both the North American prairies and the Russian steppes where the rainfall is sufficient for trees to grow if the soil were not so porous as to keep the subsoil too dry. Indeed in Southern Russia, the southern limit of the forest coincides rather with the southern limit of glacial clay than with any rainfall limit.

Once the sole preserve of nomadic, pastoral tribes, the wetter portions of these grasslands are now the scene of great agricultural enterprises, especially of wheat-growing, whilst the drier lands, such as the belt of land along the eastern margins of the Rockies, where the dry Chinook winds are experienced (Fig. 13), are more suited for stock-raising, and are so used, except where agriculture can be carried on by the assistance of irrigation. The Siberian region of this type is much behind the American region in development, but very considerable progress has been made since the construction of the Trans-Siberian Railway.

The same physical and climatic conditions are found in Manchuria, but the region is much smaller. Here, too, agriculture, chiefly undertaken by Chinese immigrants, is making great headway.

(a-c) THE CENTRAL EUROPEAN TYPE.

This region stands in a category by itself. In North America the highlands of the western Cordillera come so close to the sea that the West European Type of region of the north-west is confined to the coastal belt. The Cordillera itself forms a distinct region which acts as a barrier between the western margins and the interior lowland. In South America the proximity of the Andes to the sea also confines the climatic characteristics of the West European Type of region to the narrow coastal

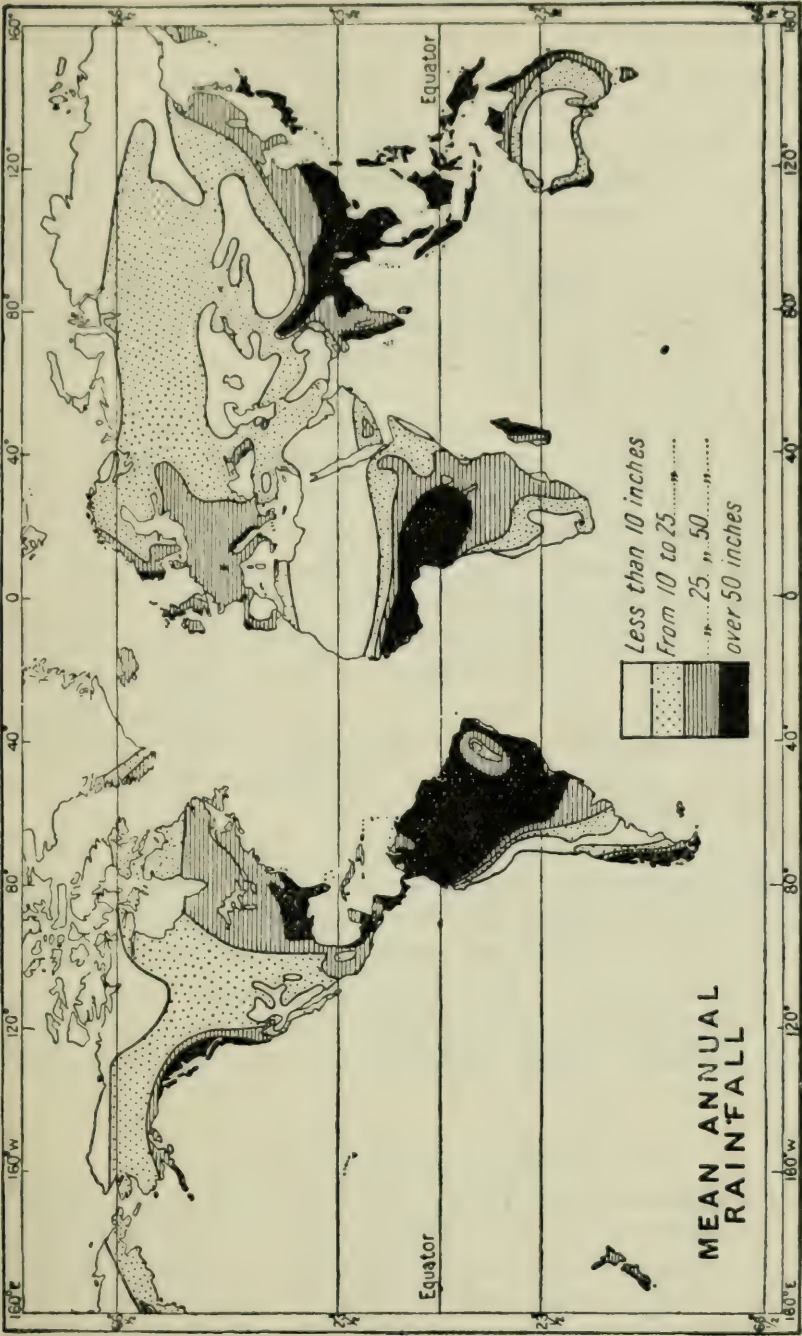


FIG 14.—The mean annual distribution of rainfall.

margins. In Europe, however, partly owing to its character as a peninsula of the world's greatest landmass, and partly owing to the fact that from the North Sea to the heart of Eurasia there is no great physical barrier, the climatic characteristics of the western marginal lands are found further inland. Moreover, these factors also result in the interior grasslands being very far from the sea, so that between the typical western marginal lands bordering the Atlantic and the steppes of Russia and Siberia there is a large area which is really a transition region partaking of some of the characteristics of both of its neighbours.

The summers are warmer than those of Western Europe, but the winters are distinctly colder. The temperature conditions tend to be extreme, but not so extreme as in the steppes. As in Western Europe, rain falls at all seasons, but, as in the steppes, there is a distinct summer maximum.

Forests form the prevalent natural vegetation, although large areas have been cleared to make way for agricultural pursuits. The trees, like those of Western Europe, are broad-leaved, except on the mountains or where there are sandy plains, *e.g.* N. German plains. Here conifers are predominant.

Wheat, rye, barley, and in some parts maize, are the principal cereals; potatoes and beets the chief root crops, and hemp and flax the leading fibre plants, whilst the vine flourishes in some of the more sheltered parts of the south. Based upon these agricultural products are many important manufacturing industries, *e.g.* brewing and distilling; sugar, starch, and linen manufacturing.

(d) INTERIOR HIGHLANDS TYPE.

The chief regions of this type are found in the Cordillera of western North America and in the highlands of S.E. Siberia. As an examination of a map will show, the North American region lies much nearer the ocean than the Asiatic area, and therefore its climate is less extreme and it has a heavier rainfall. Since most of the

rainfall in the North American region is brought by winds from the Pacific, the rainfall decreases from west to east, whilst the western slopes of all the ranges are wetter than the eastern. On account of this the western slopes have the greater forests. In the Altai and other ranges of S.E. Siberia the rainfall decreases from north to south, so that the northern slopes have more rain and are more densely forested than the southern slopes, which are drier and barer, and towards the interior plateaus have an almost desert appearance.

Local variations of altitude, of slope and of shelter produce considerable difference within these regions and give many types of occupations. The North American region is the more fully developed of the two. At first only noted for hunting and trapping, it now supports important mining, lumbering, pastoral and agricultural occupations, which are all capable of greater extension. The highlands of Siberia are capable of similar development, but at present are chiefly in the hunting stage of their economic evolution, although mining is spreading.

Of course, these are not the only highlands of the cool temperate zone. If we were to consider all the smaller areas, *e. g.* Pyrenees, Alps, Carpathians, etc., our work would be unwieldy and we should fail to get that big picture of the world in its major natural regions which it is the aim of this part of the book to give. There is, however, one special point to which it is of importance that reference should be made. We have spoken of regions of "increment," of "debilitation," of "effort" and of "wandering." Most highland areas may be described as *Regions of Difficulty*, some of the more rugged highlands and bleak plateaus as *Regions of Lasting Difficulty*. These regions have few large cities, few products of world-wide importance, but very frequently they have a contribution to make to the world, which is of supreme importance, for they export men and women. In mountainous regions life is difficult, the response of nature to the work of man is small and much labour is necessary in order to acquire

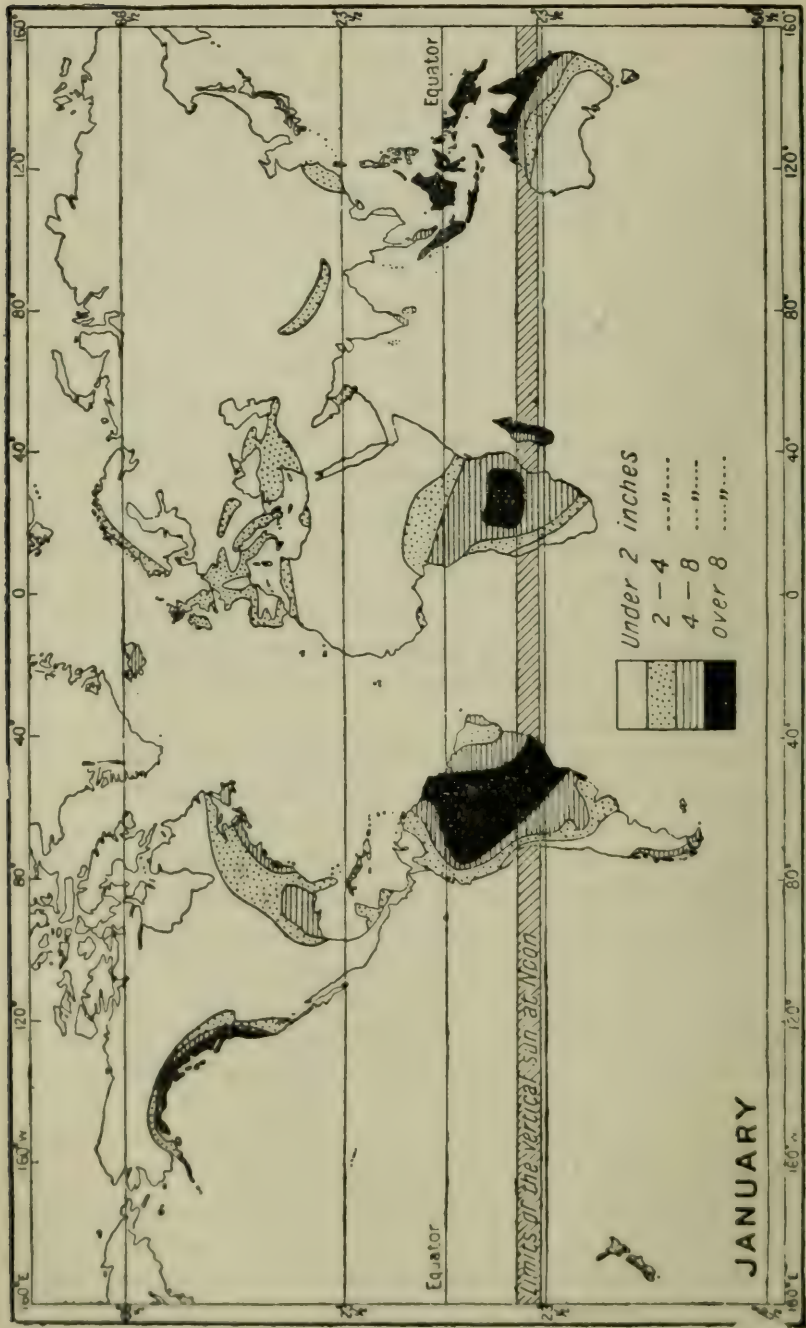


FIG. 15.—Mean rainfall for January. (After Herbertson.)

the means of life. Large numbers cannot be supported, and thus there is a steady stream of emigration. Where lands of difficulty touch the sea the exported men take up sea-faring pursuits, *e. g.* Norway; in inland areas the migration is to the plains, *e. g.* the steady stream of Welshmen who settle in the English lowland.

In another way these lands of difficulty are worthy of special attention. Their population has generally taken refuge there on account of pressure on the plains, *e. g.* the Welsh in Wales, the Slovaks in the Carpathians, the Indians in the Rockies, etc. Thus such regions become "Treasure Houses of the Past" or the "Homes of Lost Causes," where ancient customs and languages are still found and treasured. We should, therefore, bring into our consideration of such regions something of the spirit of one who is handling a rare and dainty piece of china. It is not only in the busy, modern industrial areas that we find those things which really matter and count for most.

Somewhat similar "human" conditions will be found to exist in the denser forests of the equatorial and other lands, and in the margins of deserts. For example, the pygmies of the Congo forest and the Bushmen and Hottentots of the Kalarahi margins, are the modern representatives of ancient peoples who have been driven into the more inaccessible parts by the more virile Bantu tribes.

(e) TIBET TYPE.

There are two regions of this type, the lofty plateaus of Tibet and Bolivia. Their latitudes are not those of cool temperate lands, but they are included in this group of regions because their climate is more akin to the temperate type owing to the effect of their high altitude, for both plateaus rise to an elevation exceeding two miles, whilst the ranges which cross or border them exceed twice that height in their loftiest peaks. There are, however, striking climatic differences between the two regions. The map will show that the Bolivia-Peru plateau is not only nearer the Equator than Tibet, but

is situated in a narrowing continent, whereas Tibet approaches the heart of the greatest landmass in the world. It is because of these factors that Tibet has an extreme climate, with long, cold winters and warm summers, whilst the South American region has, at least in the parts where most people live (see climatic figures on p. 30), a cool, equable climate. The figures for Lhasa show the climatic conditions of the southern Tibetan valleys, the part where the majority of the inhabitants are found. Of course, in both plateaus there are marked local differences due to changes in altitude, and these differences are marked by changes in the natural vegetation and cultivated products. On the whole, however, the highest parts of both are only suitable for pastoral pursuits (cattle, llamas and sheep in South America and yaks in Tibet), but in the more sheltered portions, cereals and fruits are cultivated. Whether the basis of comparison between the two be climate, natural advantages for settlement by man, products or means of access, the more favourable conditions will be found on the side of the Bolivia-Peru plateau.

Both are very rich in minerals, but mining is not as important as it should be owing to the backwardness of the natives and the difficulties which confront white men who attempt to dwell and work at such high altitudes, as well as to the difficulty of access. Except in their warmer valleys and more sheltered regions we must place these two plateaus among the *Regions of Lasting Difficulty*.

(4) REGIONS IN COLD LANDS.

In this group of natural regions we have three types: the Northern Forests, the Tundra and the Ice-Cap lands.

(a) THE NORTHERN FORESTS.

The vegetation map of the world (Fig. 18) shows a vast belt of coniferous forests stretching across the

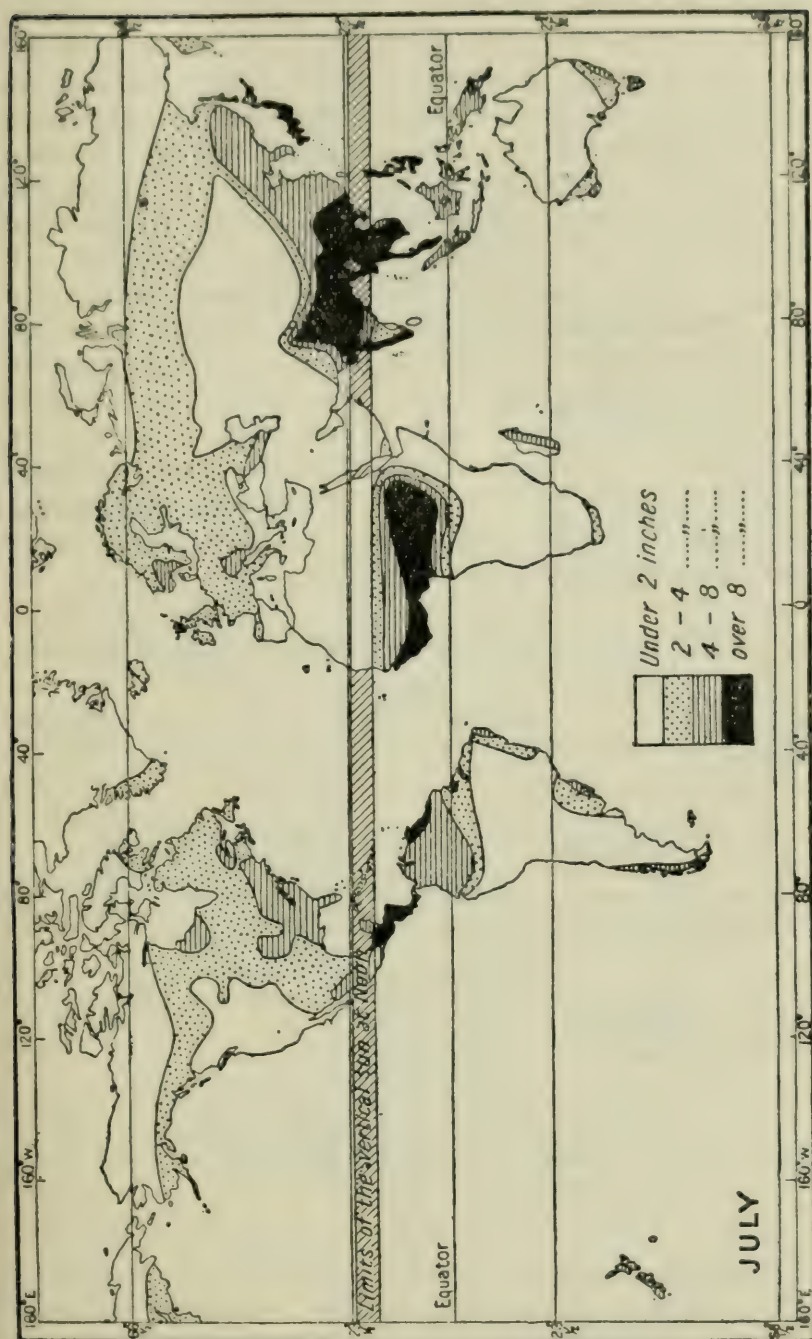


FIG. 16.—Mean rainfall for July. (After Herbertson.)

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continents of the Northern Hemisphere immediately south of the tundra. In these regions the winters are long and severe, the summers short and warm, and the rainfall, most of which comes in the summer, somewhat scanty. Instead of the ordinary large, flat leaves of the deciduous trees, the leaves of conifers, *e. g.* pines, firs, hemlocks and larches, are needle-like, since this structure checks transpiration and is therefore suited for the dryness of the climate. All these trees, except the larch, retain their leaves during the winter time, for that season is too long to be utilised as a resting period. The summers are so short that advantage must be taken of the warmer periods at both ends of the winter season. One deciduous tree, the birch, manages to thrive in such latitudes and is not only common in "coniferous" forests, but helps to give them grace, beauty and variety.

CLIMATIC STATISTICS OF REGIONS IN COLD LANDS.

Type of Region.	Town or Place.	Height above Sea Level.	Mean January Temperature.	Mean July Temperature.	Mean Annual Rainfall.	Seasonal Distribution of the Rainfall.
4 A (Northern Forests)	Dawson City	1200 ft.	-24° F.	60° F.	15 ins.	} Most in summer.
	Fort York .	60	-19°	60°	30	
	Yakutsk .	330	-47°	66°	13	
	Archangel .	50	7°	60°	14	
	Tobolsk .	350	-2°	64°	17	
4 B (Tundra)	Barrow Point	S. L.	-19° F.	38° F.	8 ins.	} Most in summer.
	Upernivik .	S. L.	-8°	42°	9	
	Nain .	S. L.	-7°	47°	19	
4 C (Ice-cap)	No statistics are available except for the short periods occupied by various Polar exploration parties. These can be obtained by consulting books describing these expeditions.					

These forests are vast resources of timber, but except in their more accessible parts, little lumbering is carried on. They shelter fur-bearing animals and these give a means of livelihood to scattered bands of hunters and

trappers. On their southern margins, in Central Canada, Russia and Siberia, large areas have been and are being

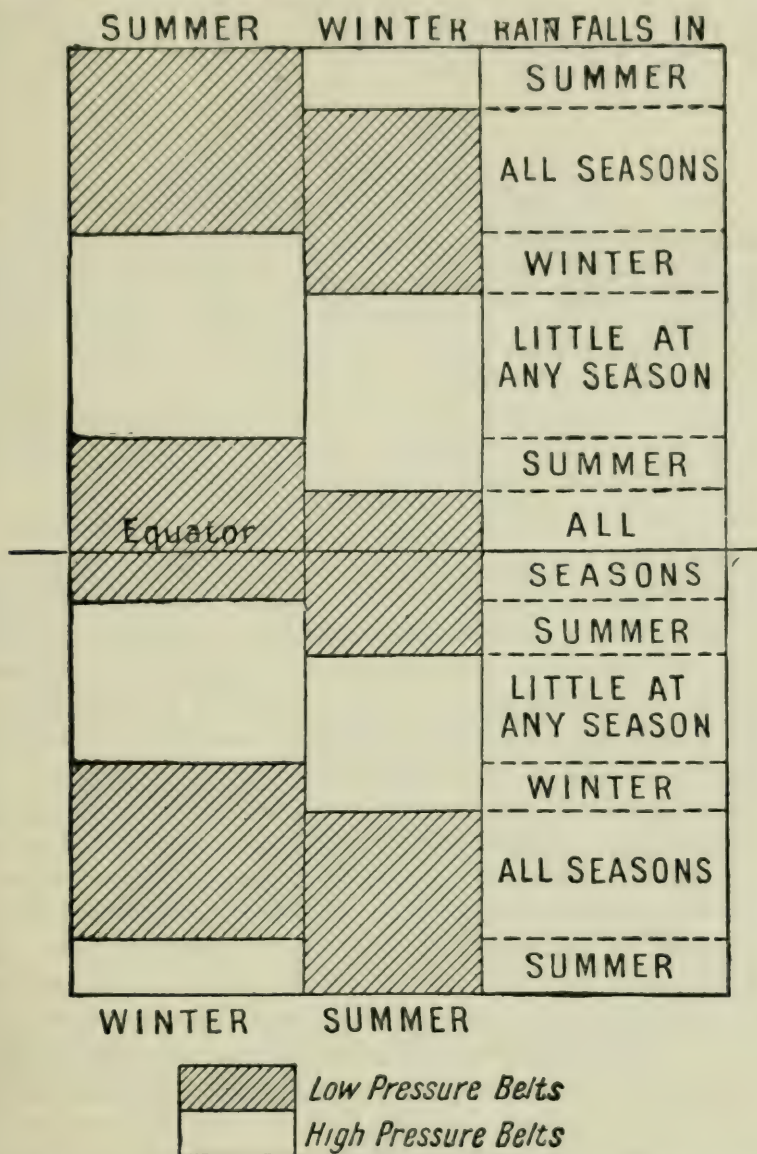


FIG. 17.—The influence of the migration of the pressure belts on the distribution of rain on the western margins of continents.

cleared to make way for mixed farming. Cereals can easily be ripened, for although the summers are short,

the days are very warm, and, owing to the latitude, very long. Therefore cereals ripen in fewer days than are taken in more southerly latitudes. As should be expected the hardier cereals, such as rye and oats, are more common than wheat.

(b) THE TUNDRA TYPE.

In both North America and Eurasia, regions of this type occupy the Arctic lowlands. There are no lands of this type in the Southern Hemisphere owing to the absence of land in those latitudes where they would otherwise probably be found. The tundra, called the "barrens" in North America, lies north of the belt of coniferous forests just described, and almost entirely within the Arctic Circle. The winters are long and severe, for many days the sun in most parts never rises above the horizon, whilst the summers are short and warm (see "Climatic Statistics" on p. 44). Even during July, the warmest month, the mean monthly temperature falls below 50° F. The rainfall is very small indeed and rarely exceeds an annual average of more than 10 inches.

It is because of such climatic conditions that the tundra is really a cold desert. The only plants are mosses, lichens, and lowly forms of berry-bearing shrubs and bushes, such as crowberries and cranberries. There are no trees, for the ground never thaws below a depth of a foot or so, whilst the cold, biting winds of winter are so strong that tree life is impossible. Yet even in such a region as this both man and beast are found. Scattered tribes of Eskimos (North America), Lapps and Finns (Europe), and Ostyaks and Samoyads (Asia) manage to eke out an existence by means of hunting and fishing. In the Old World the reindeer is domesticated and provides its owner with almost everything he needs, either for food, clothing or shelter, but its North American counterpart, the cariboo, is wild and has to be hunted. In the Arctic seas the seal, the walrus, and the polar bear are hunted, the seal being by

far the most important. Fish can be obtained both from the sea and the rivers.

Tundra dwellers are nomadic and few in number, for lands such as theirs cannot support many. They are well described as *Regions of Privation* where man, no matter how much energy he puts forth, can never reap reward in the shape of ease, comfort or leisure. Life is one long struggle.

Regions resembling the tundra are also found on most of the higher mountains of temperate latitudes, and even on the highest mountains of the tropics. Thus, southern extensions of the Old World tundra are found on the Scandinavian Highlands and the Ural Mountains, whilst similar extensions are to be met with in the western highlands of North America.

(c) ICE-CAP TYPE.

All who have read the glorious but sad story of Captain Scott and his journey to the South Pole, are familiar with this type of region. The greater part of the Antarctic Continent, of Greenland and of many of the islands off the North of Canada, are buried beneath great caps of ice of unknown thickness. These ice-caps are formed of snow pressed into ice. Every year snow falls on the lands, and the greater the fall the greater the pressure. Just as an unkind boy by long pressure can press a snowball so that it becomes a hard ball of ice, so the pressure of the most recently fallen snow converts the lower layers into ice. The pressure is steadily exerted year after year so that the ice-sheet presses outwards very slowly. Along the coasts of Greenland and of the Antarctic, where the edge of the sheet is pressed out to sea, large blocks break off and float away as icebergs.

The western coastal strip of Greenland is habitable and there we find Eskimos who hunt seals, walruses, and polar bears. In summer these northern seas and coasts are also visited by whaling fleets from British Columbia, Newfoundland, Scandinavia, Britain, etc.



FIG. 18.—The distribution of natural vegetation.

There is no permanent settlement in the Antarctic, where the conditions are even more inhospitable, but, as we know from the wonderful pictures of Scott and Shackleton, whales, seals, and penguins manage to find the means of life. For man, the land is a region of hunger and great privation, and without outside help a land in which he must die. In the winter the sun is not seen above the horizon for many days—the exact number depends upon the latitude—whilst the summer is one long day.

EXERCISES.

(Some of these exercises are designed to test the background of general geographical principles which the student should possess in order to appreciate fully the text of Part I of this book.)

1. Write an account of an imaginary trip up the Amazon from Para to Manaos.

2. What are Trade Winds? Where do they blow? What effect have they (*a*) over the oceans, (*b*) over the lands?

3. Why is it that:—

(*a*) The sun is higher in the sky in London in summer than it is in winter?

(*b*) Temperature maps of the Southern Hemisphere indicate a more equable distribution of temperature than in the Northern Hemisphere.

(*c*) Polar lands are colder than equatorial lands?

4. Give some account of the cause of, and the results of, the apparent migration of the sun with the seasons.

5. What do you understand by a "monsoon type of climate"? Describe and account for its leading characteristics.

6. Describe and account for the different kinds of country which would be seen on a journey in a straight line from (*a*) Lagos to Algiers, (*b*) Mombasa to the mouth of the Congo.

7. Give examples of the influence of ocean currents upon climate.

8. How far is it true to say that the surface ocean currents of the North Atlantic are as if the water had been stirred by a great stick in the direction taken by the hands of a clock? Could this statement as it stands be applied to the Southern Hemisphere?

9. Why is it that the climatic conditions of Eastern Canada are very different from those of the lands of Western Europe lying within the same latitudes?

10. What is meant by (*a*) an insular climate; (*b*) a continental climate? Account for all the facts you mention and give examples.

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11. Mention any three areas in the Southern Hemisphere which appear to you to belong to the same group of natural regions. Give full reasons for your choice of regions.

12. Which parts of the world have (a) a heavy rainfall; (b) a deficient rainfall? Give full reasons for all statements you make.

13. "Most of the deserts of the world are found on the western margins of continents, in those latitudes over which the steady Trades blow." Discuss this statement. In what other parts of the world are deserts found?

14. Make a series of maps (relief, climate, natural vegetation, etc.) of *one* of the southern continents. Now attempt to make a map showing the natural regions. Compare the result with that on Fig. 1.

15. What are the chief factors which determine whether the natural vegetation of a region shall be forest, grassland, or desert? Give examples.

16. Give examples of "regions of increment," "regions of privation," "regions of effort." On what basis have these names been given?

17. Why is it that :—

- (a) Manaos (p. 6) has the same mean temperature in January as in July?
- (b) Quito (p. 6) shows little difference in temperature between winter and summer?
- (c) Daly Waters (p. 6) is warmer in January than in July?
- (d) Walfish Bay (p. 6) is so relatively cool in January?
- (e) San Francisco (p. 19) is so cool in July?
- (f) Shanghai (p. 19) is so cold in January?
- (g) Cheyenne (p. 19) is included in an interior lowland type?
- (h) Victoria and Hobart (p. 30) have less rainfall than the others?
- (i) Vladivostok (p. 30) is much colder in winter than Halifax and Montreal?
- (j) Calgary (p. 30) is 19° F. warmer than Winnipeg in January?
- (k) Lhasa (p. 30) has a more extreme climate than La Paz?
- (l) Lhasa and La Paz (p. 30) have most rain in summer?
- (m) Archangel (p. 44) is warmer in winter than the other towns in the same group?
- (n) Nain (p. 44) has a heavier rainfall than Barrow Point and Upernivik?

PART II

THE BRITISH ISLES

GENERAL PHYSICAL AND ECONOMIC CONDITIONS.

POSITION AND SURROUNDING SEAS.

THE British Isles have not always been separated from the Continent. They are really the higher parts of the partly submerged north-western portion of Europe, and the beds of the shallow seas which surround them are really drowned plains and lowlands. Fig. 19 shows the extent of the continental shelf, ledge, or platform above which the islands rise. It is seen to extend to about 100 miles west of Ireland, beyond which the ocean floor rapidly falls to the great abyss of the Atlantic deeps. Even if the continental shelf were only 300 feet below sea-level the greater part of it would become dry land and the British Isles would once more be attached to the mainland. On the other hand, a further submergence of 300 feet would lead to the loss of a considerable portion of the present land surfaces, especially in England, where the plains are of greatest extent. The shallowest part of the North Sea is the famous Dogger Bank, located about the west centre of the sea. Over this bank the water is only from 10 to 20 fathoms deep. Thus, although Britain lies so close to the Continent that she can easily maintain relations with those countries lying opposite her shores, for the seas are not too wide to prevent the easy flow of peoples and ideas, yet the sea is her great means of defence and has kept her free from invasion by a

foreign foe, whilst many of her peoples have become so much at home on the sea that she is the leading maritime nation of the world.

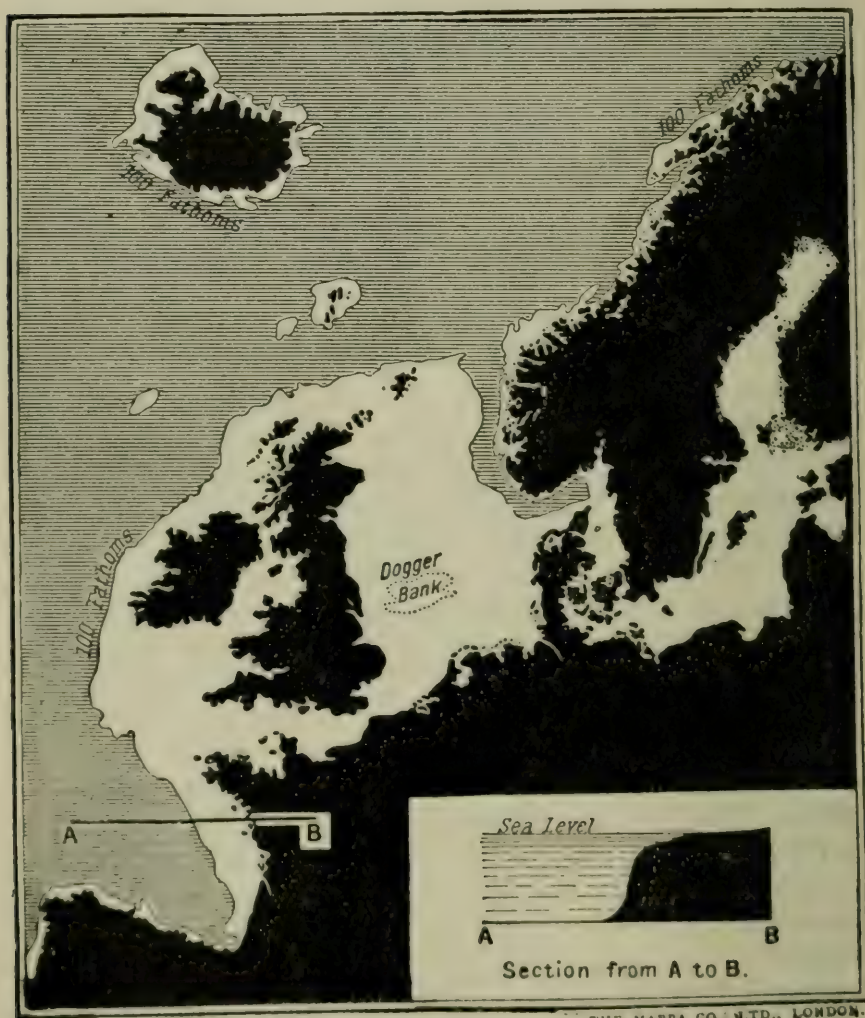


FIG 19.—The British Continental Shelf.

The Continental Shelf and Fishing.—As in the case of the continental shelf of Newfoundland, the shallowness of the British Seas encourages great fisheries. The sun's rays cannot penetrate to the bottom of deep

oceans, but in the shallow waters of a continental shelf there is sufficient light for the growth of marine animal and vegetable life. Many marine plants, such as seaweed, attach themselves to rocks or to the sea floor, but besides these there are countless numbers of microscopic floating plants. These and the tiny, lowly floating animal forms of life found in the ocean form the food of fish which also feed upon each other. The name *plankton* is given to this floating fish-food, whether animal or vegetable.

The Continental Shelf and Tides.—Out in the open ocean the amplitude of the tide, *i. e.* the difference between high- and low-water mark, does not exceed more than one or two feet, but when the incoming tidal waves reach shallow seas and sweep along narrow channels, the waters are heaped up and the amplitude is very considerably increased. When the tidal waves reach funnel-shaped estuaries like that of the Severn, the ever-increasing narrowness of the estuary may produce at its head a rise as high as 40 to 60 feet—although at the entrance to the Bristol Channel the rise of the spring tide is only about 10 feet—and cause the ocean water to proceed upstream like an advancing wall of water. On the Severn this phenomenon is known as the *bore*, and on the Trent, the *eagre*. The high tides experienced in British estuaries make it possible to have ports as far from the open sea as London. The work the tides do for a port like London, in carrying upstream with the flow vessels of all kinds, and in carrying them seawards with the ebb, is not sufficiently recognized. In addition, the constant movement of waters, due to the strongly marked currents of the British Seas, sweeps channels clear and is invaluable to fishing, since the supply of fish food is constantly being renewed.

THE RELIEF OF BRITAIN

Britain has no mountains comparable in elevation with the high mountains of Europe, *e.g.* the Alps. The highest mountain, Ben Nevis, attains a height of only 4,406 feet. Nor are there large areas whose elevation exceeds even half that altitude. But it must be remembered that, in a country like Britain, land rising more than 1,000 feet above sea-level is economically of very little value unless it contains valuable mineral wealth or rushing streams which may be utilized for motive power. The highlands of Britain are to be found chiefly in the west of Great Britain and in detached masses lying round the coastal margins of Ireland. In Scotland three clear physical units are noticed: (1) the Northern Highlands, north of a line drawn from Dumbarton to Stonehaven; (2) the Central Lowlands; and (3) the Southern Uplands. In England and Wales the Pennine Chain is flanked by plains, but is attached by Shap Fell to the Cumbrian Mountains in the north-west. The Cambrian, and Cornwall and Devon Highlands are close to the west coast, whilst central and south-eastern England is a great lowland crossed by low ranges of hills. In Ireland, the centre, except for the Slieve Bloom Mountains, is an extensive plain, which reaches the east coast between the Wicklow Mountains and the Mourne Mountains. Notice that this plain faces the Cheshire Plain, which forms a broad gap between the Pennines and the Welsh Mountains. Round the margins of Ireland lie the various highland areas of the north, west and south, separated from each other by plains over which the rivers find their way to the sea.

THE STRUCTURE OF BRITAIN.

The surface rock exercises a marked effect on the life of a region. Upon its nature depend the quality and quantity of the soil, the abundance or the scarcity of

surface water, the positions of towns and villages, and in many cases the character of the occupations followed. The geological formations of Britain are exceedingly varied and complex (see Fig. 20). They are closely related to those of the Continent, *e.g.* the highlands of N.W. Ireland and Scotland are continuations of those of Scandinavia, the chalk ridges of S.E. England are continued in France, S.W. England is a counterpart of Brittany. In Britain, it is not so in all countries, the highest elevations are composed of the oldest rocks, which are also the hardest. There is a remarkable contrast between that part of Britain lying south and east of a line drawn from the mouth of the Exe in Devonshire to the mouth of the Tees, and that part lying north and west of that line. North and west of the Tees-Exe line are most of the highland regions of the British Isles. This part of the country is largely composed of rocks older than the coal measures. The sandstones are hard and gritty, the clays, under the influence of enormous pressure, have become slates, the limestones are crystalline, and in many places have become hard marble, whilst there are extensive areas of very ancient igneous rocks such as granite and gneiss. South and east of the Tees-Exe line is an extensive lowland, crossed by low scarped hills usually running in bands in a N.E.-S.W. direction, and composed of rocks younger than the coal measures, *e.g.* new red sandstone, clays, oolitic limestone, and chalk. The structural differences between these two parts of Britain have had an enormous effect not only upon the industry and occupations of the inhabitants, but upon the inhabitants themselves and upon their history. The north-western part has the boldest and most rugged coasts, the highest, the barest, and most infertile, and therefore the least populated, areas of Britain; whilst the south-eastern part has lower coasts, excepting where the hills run out to the sea, *e.g.* at Beachy Head, Dover and Flamborough Head, but it is there that the richest agricultural lowlands are to be found, and it was there that, until the days of the modern manufacturing

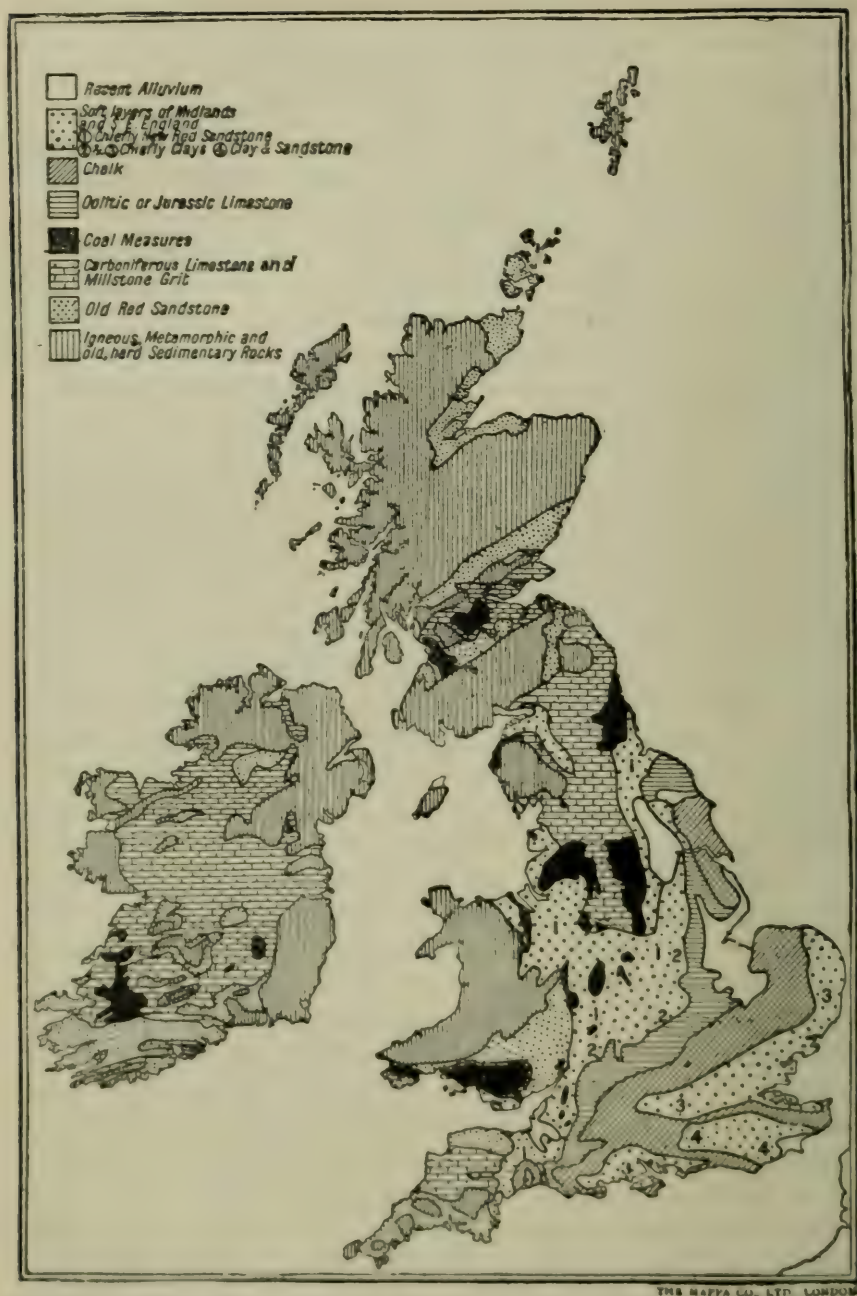


FIG. 20. —Geological Map of Britain (simplified).

epoch which depends upon supplies of coal and iron, the bulk of the people lived.

During the Great Ice Age, North-western Europe and the British Isles north of the Thames were covered by ice sheets and glaciers which had gradually spread outwards from the north. Evidences of the changes wrought by the action of ice are widespread. Mountain masses were rounded; valley lakes, like those of the English Lake district and of Scotland, were formed by the deposition of morainic materials which dammed river valleys; great sheets of boulder clay were left; steep-sided ridges and banks of stratified deposits of sand and gravel, called *kames* in Scotland and *eskers* in Ireland, were formed in tunnels made by streams flowing under the ice; whilst last, but in importance by no means least, it may have been the enormous weight of the ice which caused the depression of the whole of north-western Europe.

THE CLIMATE OF BRITAIN.

General Remarks.—The British Isles lie on the western margin of a continent in those latitudes whose prevailing winds are westerlies at all seasons. In January, when the prevalent distribution of pressure shows a well-developed low-pressure system over the northern part of the North Atlantic, with its centre over Iceland, the inflowing winds give to Britain south-west winds. In July, too, south-west winds prevail, but during that month they are blowing from the Atlantic high-pressure system located in the latitudes of the Azores. The climate of Britain is also affected by cyclonic depressions, of greater or less intensity, which usually cross the country from west to east and are accompanied by changeable winds, unsettled weather and rain. On the average one of these cyclones reaches Britain every ten or eleven days, but they are more frequent in winter than in summer. Less frequently the British Isles are under the influence of high pressure or anti-cyclonic conditions, and at such times fine weather, if by that

term the absence of rain is meant, is usually experienced. If anti-cyclones occur less frequently than cyclones, they are more enduring. They are marked by calm weather and an almost invariable absence of rain, and occur in winter quite as frequently as in summer.

Temperature.—Fig. 21 gives the mean January and July sea-level isotherms. In January the temperature falls from west to east and not from south to north. This is indicated by the north and south direction of the isotherms

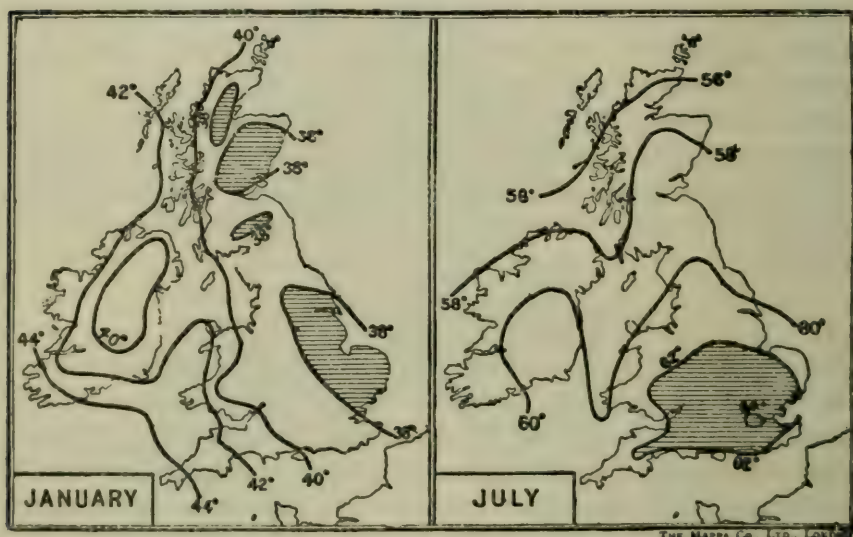


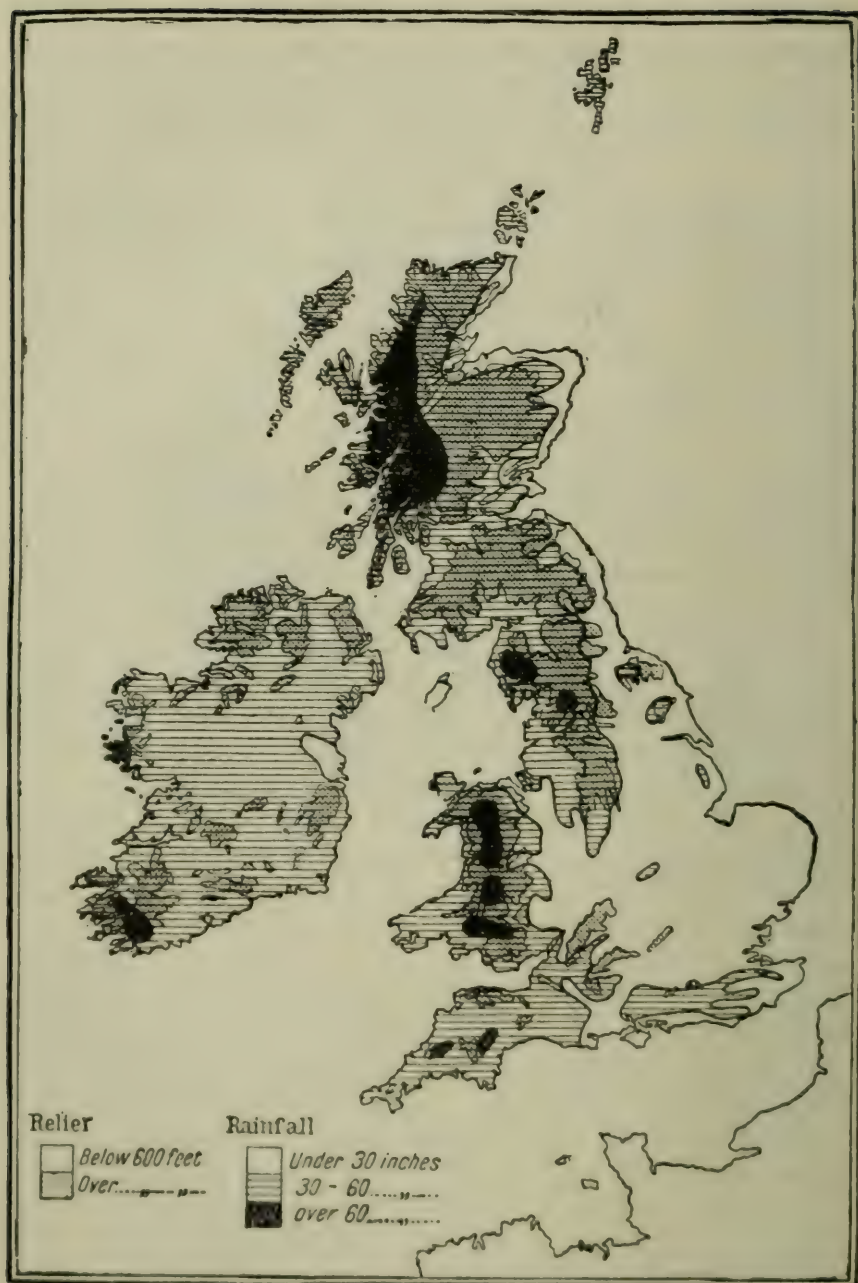
FIG. 21.—Mean Sea-level Isotherms.

—of which that of 40° F. may be regarded as typical. It is thus clear that at this time of the year distance from the Equator, upon which the height of the sun throughout the year depends, is not of such great importance as distance from the warm Atlantic Ocean. The coldest area in Ireland is the eastern part of the Central Plain, and in Great Britain the east coast. In July, the isotherms take an east and west direction, showing that temperature decreases from south to north. The southerly bends over seas and the northerly bends over Ireland and Great Britain are, of course, due to the

greater heat of the land compared with the sea. The warmest part of Britain is seen to be in the south-east, which is least affected by the cooling of the great ocean to the west and at the same time receives the sun's rays less obliquely than the north.

The part of Britain with the greatest range between summer and winter is the south-east, where a large area has a January temperature less than 38° F. and a July temperature exceeding 62° F. The most equable temperatures are experienced in western Ireland and south-western England, where the mean annual range of temperature is only about 16° F. No part of Britain has what is known as an extreme or continental type of climate. Its insular position on the western margins of a continent makes this impossible. Everywhere its climate is typically temperate and equable, yet it is well to remember, even within the limits of Britain, which parts have a greater or less range of temperature than others.

Rainfall.—There is a very close connection between relief and the distribution of rainfall (see Fig. 22). More rain falls on the higher western margins than on the lower eastern parts of both Ireland and Great Britain. The east receives a smaller rainfall than the west, not because the greater part of the rain has fallen in the higher west, but simply because the winds are not forced to ascend any greater elevations than those of the comparatively low chalk ridges of south-eastern England, or, in the case of the Highlands of Scotland, where the Eastern Grampians are as high as the Western Grampians, the plateau-like configuration of the whole gives no further marked ascent as the wind proceeds eastwards. The frequency of eastward-moving cyclones has already been commented upon. These would bring rain without the aid of relief, since in a cyclonic system the spiral inward movement of air forces air to ascend and therefore to become cold and less capable of holding water vapour. Therefore, when these cyclones cross the western mountains of Britain there are two factors at work in causing the forced



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FIG. 22.—The Distribution of Rainfall marked on a map showing the land over 600 feet above sea-level.

ascent of moist air, but in the eastern lowlands most of the rain which falls must be of simple cyclonic type.

PLANTS AND ANIMALS OF BRITAIN STATISTICS.

General distribution of the surface of the British Isles in 1915 (woods and plantations in 1913):—

Divisions.	Total Surface (1000 acres).	Woods and Plantations (1000 acres).	Mountain and Heath Grazing Land (1000 acres).	Permanent Pasture (1000 acres).	Arable Land (1000 acres).
England .	32,388	1,697	2,459	14,038	10,273
Wales .	4,750	187	1,306	2,049	693
Scotland .	19,070	852 ¹	9,134	1,491	3,290
Ireland .	20,248	296 ¹	No figures	9,721	4,999
Isle of Man .	141	1'4	26	19	71
Channel Isles .	44	'2	2	10	21
Totals .	76,641	3,033'6	12,927	27,328	19,347

Long ago the British Isles were clothed with forests which were mainly of the deciduous or broad-leaved kind. These forests to-day only exist in samples, *e.g.* the New Forest of Hampshire and the Forest of Dean in Gloucestershire. The famous forests of Arden, Epping, Sherwood and the Weald have almost disappeared, while the deer "forests" of the Highlands of Scotland are really open heaths and moorlands. Very little British-grown timber is now used, most of the country's needs being met by the importation of timber from Scandinavian and Baltic countries. In many ways the afforestation of regions unsuitable for agriculture or other purposes is an urgent necessity. The deer "forests" of Scotland could produce as good timbers as Scandinavia, and in doing so would certainly be of greater value than at present. The afforesting of Highland regions would also regularize the water supply to the rivers and would probably make many of the falls of great value in providing electrical power for use in

¹ Area in 1914.

lumbering and allied industries. As the figures show, there is considerably more mountain and heath vegetation—that is, almost barren moorlands where little grows except poor grass, moss, heather and bracken—than forest. These moorlands are chiefly found at elevations exceeding 600 feet, so that in this respect England has a smaller proportion of moorland than Scotland, Ireland, or Wales. In the case of Ireland the exact figures are not available, for the moorland is incorporated with the pastures.

The most valuable pastoral and agricultural lands are the permanent pastures and the arable lands. Most of the moorlands are also used for pasture, as, for example, central Wales and Exmoor, so that the permanent pastures should be added to the moorlands to give the total land used for grazing. The permanent pastures may be divided into rich pastures, like those of the plains and vales of central and western England, south-west Wales and central Ireland, and the poorer pastures, which include the moorlands and hill pastures like those of the scarplands of south-eastern England. The best arable lands are found in the drier lowlands of eastern England, for land which is too high and steep or too wet cannot be used for agriculture on an extensive scale (see Fig. 23).

Cultivated Plants.—Of the cultivated crops of Britain *wheat* is the most important cereal. It is most extensively grown in the eastern counties of England, where suitable climatic and soil conditions are found. Wheat requires a sufficient but not too heavy rainfall, as too much rain causes the plant to become diseased. It also requires a warm and sunny summer in order to ripen and give a good colour to the grain, whilst it is best grown in a stiff fertile soil like the boulder clay which covers large areas of eastern England. The average East Anglian yield in bushels per acre, over 30, exceeds that of any other country in the world, and yet only about one-fifth of the wheat used in Britain is home-grown! The cultivation of *oats* and *barley* is more widespread than that of wheat, as these

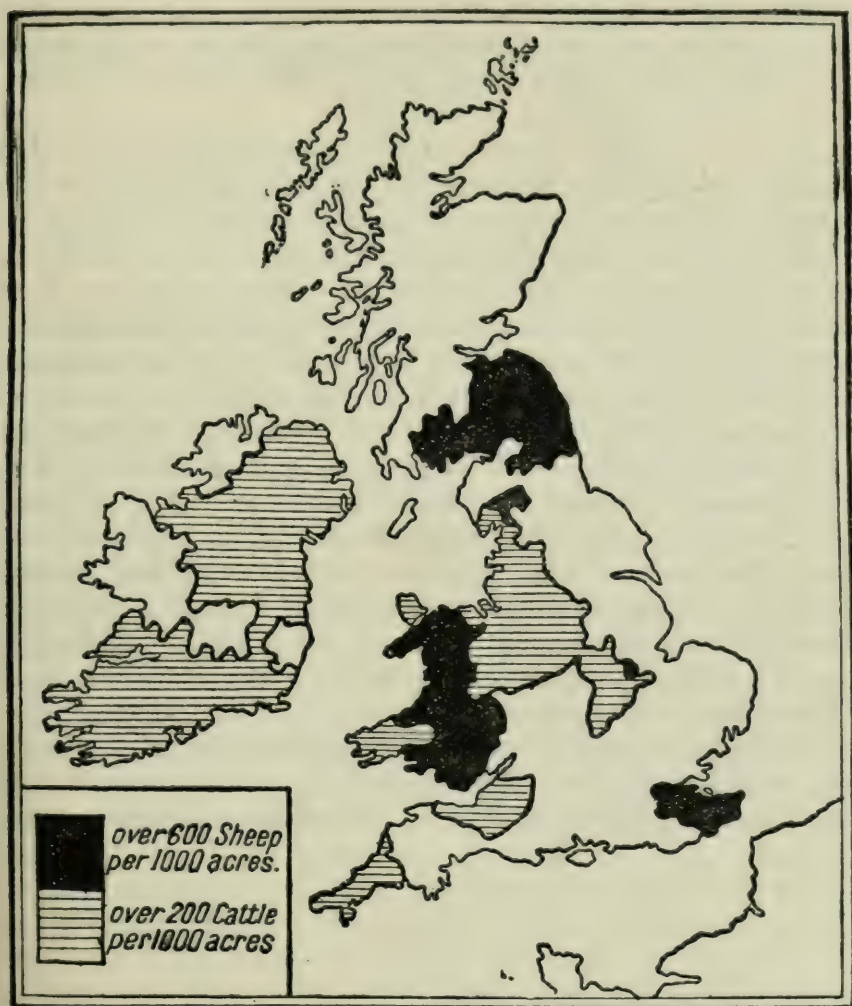


FIG. 23.—Economic and Population Maps of Britain.

cereals do not require so much sun and will grow in poorer soils. Root crops, such as *turnips*, *swedes*, and *mangolds*, are grown for winter food for cattle and sheep. Formerly it was the custom to kill cattle in autumn and to salt the flesh for winter use, a practice which resulted in skin diseases being widespread. *Potatoes* form a most important article of human diet, especially in Ireland, where enormous quantities are grown, although unfortunately Irish potatoes are liable to disease. The best British potatoes are grown in eastern Scotland and eastern England. Of *fruits*, apples, pears, plums, cherries, etc., are all very largely grown. The chief areas where these are produced on a large scale are on rich lands like those of the Weald, the lower valleys of the Severn and its tributaries, the Warwickshire Avon and the Wye, and the Carse of Gowrie, which lies between the Sidlaw Hills and the Firth of Tay. Early fruit, vegetables and flowers reach London and other centres from S.W. England, the Scilly Isles, and the Channel Isles. *Hops*, for the making of beer, are largely grown in Kent and in the middle basin of the Warwickshire Avon. Of fibre plants, *flax* is grown in Ulster, although not in sufficient quantities to keep pace with the demands of the Irish linen industry.

Pastoral Occupations.—Although cattle, sheep, pigs and horses are all reared in large numbers, the home supplies of meat, hides, dairy produce, mutton, wool, bacon and horses have to be supplemented by large imports. Where *cattle* are most numerous *sheep* are usually least so, except in such areas as really suit neither, and where neither are found in very large numbers, *e.g.* the Highlands of Scotland. Fig. 24 shows that there is practically no overlapping of those areas where there are over 200 cattle per 1,000 acres, with those supporting over 600 sheep per 1,000 acres. The reasons for this are that the richest pastures are best suited for dairy cattle, whilst sheep thrive best on the drier, poorer mountain pastures of the west and on the porous chalk and limestone hills of eastern England, where they are less liable to suffer

from foot-rot. The best cattle pastures are the central plain of Ireland, the western plains of Devon, Somerset, Hereford, S.W. Wales, Lancashire, Cheshire and the



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FIG. 24.—The Distribution of Cattle and Sheep.

English midlands. In all these places the rainfall is fairly heavy and supports rich grass. Hence we have the famous cheeses of Cheddar and Cheshire, the noted Irish butter and Devonshire cream, and the extensive boot and shoe industries of towns like Northampton and

Leicester. Sheep are largely reared on the poorer pastures of the southern uplands of Scotland, the Highlands of Wales, and the oolitic and chalk scarplands of the E. and S.E. of Great Britain. In the middle ages Britain exported most of her wool to Flanders, but to-day she has to supplement her home supply by importing wool from Australia, New Zealand, South Africa and Argentina.

Pigs are chiefly found in those areas noted for the rearing of cattle. The reason for this is that they are largely fed on skimmed milk and potatoes. Ireland is especially famous for its bacon and hams, and so are Wiltshire, Cumberland and Yorkshire. Despite the modern methods of transport by steam and electric railway and by petrol driven cars, *horses* are still in great demand for work on the land as well as for sport and military purposes. They are largely reared on the drier plains of Ireland, Scotland and England, and in areas noted for the growing of oats. Clydesdale, the Vale of York, and the East Riding of Yorkshire have long been noted, not only for heavy cart-horses, but also for lighter horses suitable for carriage and general light draught purposes. Small ponies are reared in the Shetland Isles, the Highlands of Wales and Scotland, and on Exmoor and Dartmoor in south-western England. Modern methods of haulage are now, fortunately, superseding the use of ponies in coalmines. Most of those now reared are used for very light draught or pleasure purposes.

THE REGIONS OF THE BRITISH ISLES.

NORTHERN ENGLAND.

PHYSICAL FEATURES.

THE outstanding feature of the relief of Northern England is the *Pennine Chain*, a great earth-fold built of mountain limestone. The Pennines, which are about 120 miles from north to south and are not very high compared with their breadth (Cross Fell, the highest peak, is only 2,892 feet), are nearer the west coast than the east coast, so that the longer rivers flow to the North Sea. Their tops are extensive moorlands, and being rounded, may be aptly compared with the representation of the King's head, standing up from a penny in low relief. It is important to understand and to visualize this feature of the Pennines very clearly. Formerly the mountain limestone of the Pennines was covered with layers of millstone grit and coal measures (Fig. 25); but these have been denuded, so that the coal measures are now only found at the four corners shown on Fig. 20. To the north the Pennines are separated from the Cheviot Hills, whose southern slopes form the highlands of Northumberland, by the narrow gap drained by the South Tyne. This is the famous *Tyne Gap*. About the centre of the system there is the *Aire Gap*, which we shall also refer to later, on account of the important routes which follow it. Midway between the Aire and Tyne Gaps, the Pennines are attached to the Cumbrian group of mountains by *Shap Fell*, which is over 1,000 feet in elevation, and is a difficult barrier which must be crossed by the routes to

Carlisle. Overlooking the valley of the Eden the great Pennine Fault forms precipitous cliffs, above which towers Cross Fell. The formation of this fault let down the rocks on the west, which were formerly at the same level as Cross Fell Edge, and thus exposed to the east of the Eden valley the steep slopes of the fault face.

Of the Pennine rivers, those flowing eastwards, such as the Tyne, the Tees, and the headstreams of the

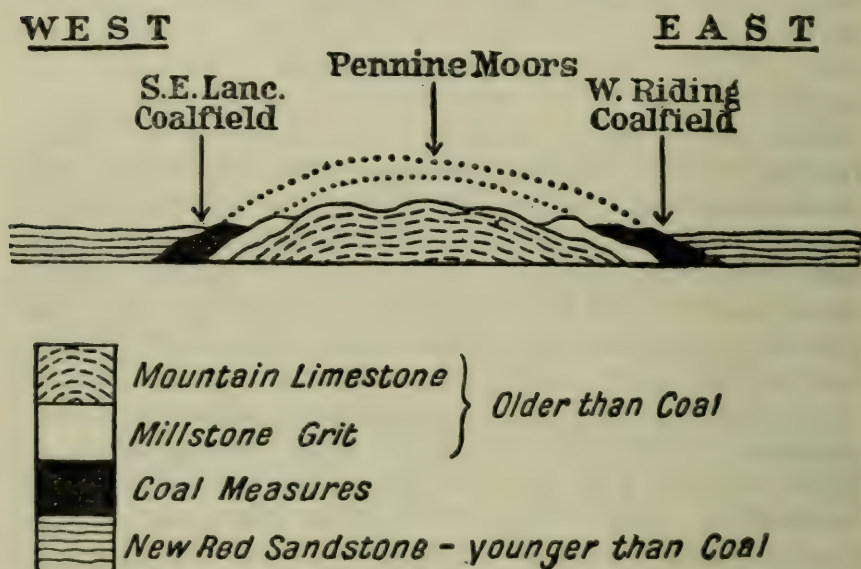


FIG. 25.—Section of Pennine Chain.

Yorkshire Ouse, have all cut a series of dales which offer routes across the mountain barrier. The western rivers are shorter, but they reach the sea independently of each other (*cf.* the Yorkshire Pennine streams) and all possess estuaries due to the sinking of the lower portions of their valleys. Only one of these estuaries, that of the Mersey, is, however, of first-class importance.

The Lake District.—The Cumbrian Mountains have been made by the denudation of an ancient dome-shaped uplift largely composed of volcanic rocks, which have given to the district much of its beauty. Scawfell Pike (3,210 feet), the highest mountain in England, is

composed of hardened volcanic ash. Helvellyn (3,118 feet) and most of the other high peaks are also volcanic, but Skiddaw (3,054 feet) is built of slates. Owing to the dome shape of the original uplift the valleys radiate from the centre like the spokes of a wheel. Most of them are partly filled by lakes whose great depth points to the fact that the valleys must have been subjected to erosion over a very long period of time. The lakes themselves are typical long and narrow valley lakes often formed by the accumulation of water behind morainic barriers left by the glaciers which formerly occupied the valleys. They are drained by rivers which are busily engaged in accumulating deltaic materials at the points where they enter the lakes, so that eventually the lakes will disappear, and in their place there will be small, fertile, lake plains. In this connection notice that Derwentwater and Bassenthwaite are both in one valley, and that they have been formed by the growth of deltas which cut a former single lake into two portions, now separated from each other by a small lake plain.

The remaining highland areas of Northern England are found in two isolated masses east of the Pennines. The first is the *Yorkshire Moors*, which forms part of the belt of oolitic limestone, including Edge Hills and the Cotswolds. The *Yorkshire Wolds* are separated from the Moors by the Vale of Pickering, drained by the Derwent. They form the northern part of the chalk scarplands, in which breaches have formed the Wash and the Humber. Both the Moors and the Wolds have steep faces looking north-west and north (see Fig. 26).

The Plains.—The southern Pennines are surrounded on three sides by broad plains which reach the sea on the west, extend to the Moors and Wolds on the east, and to the oolitic limestone escarpment on the south. These plains are composed of new red sandstone, and are covered in parts, especially in the Vale of York, with fertile boulder-clay and alluvium. The coastal plains bordering the Cumbrian Mountains are very narrow, but broaden out into the extensive plains

of Solway Firth and the lower Eden valley. On the east coast the coastal plains of Northumberland and Durham are narrow, but extend inland along the valleys of rivers like the Tyne and the Wear, and become broader towards the south. The *Vale of Pickering* gives the Vale of York an access to the sea between the Moors and the Wolds. The river Derwent, which drains it, rises very close to the east coast. Formerly it flowed to the North Sea, but its outlet was dammed by moraines and its waters diverted to the Ouse. The remaining plain is *Holderness*, forming the long, narrow, low peninsula terminating in the Spurn Head, which is built of materials carried southwards by currents. Holderness is formed of glacial drift, clays and sands. No part of it exceeds 100 feet in elevation.

COALFIELDS.

Northern England is the most important industrial region of Britain. Its four coalfields lie on the south-west, north-west, north-east and south-east flanks of the Pennines (see Fig. 27).

I. *The S.E. Lancashire Coalfield*.—The factors which have most influenced the development of the Lancashire industrial region are its abundance of coal, its water supply, its climate and its position. Formerly, much iron was also found, but the supply is now almost exhausted, so that iron has to be imported. The abundant water supply from Pennine streams was important in supplying power in the earliest stages of the region's development, whilst it is now invaluable for industries like bleaching, as well as for supplying the domestic needs of a very large industrial population. The climate has been instrumental in the determination of the kind of manufacturing the region was best suited for. The prevailing westerly and south-westerly winds are heavily laden with moisture, and when forced to ascend the western Pennines they are cooled and rain is liberated. Therefore, the humidity of the air is constantly high, and as cotton breaks if spun in a dry climate, it

is best manufactured in a humid climate such as that experienced in S.E. Lancashire. This climatic factor is especially important in the spinning of finest counts, in which Lancashire excels. Thus we find that the Lancashire spinning towns (Oldham, Bolton, Bury, etc.) lie in exposed valleys, whilst the weaving towns (Preston, Blackburn, Darwen, etc.) are either on the drier plains or in sheltered valleys. The region is splendidly situated with regard to facilities for importing the raw cotton, three-quarters of which comes from south-east United States, and most of the rest from Egypt and India. The chief ports are Liverpool and Manchester. Around the cotton industry other manufactures have sprung up. Of these, bleaching, calico-printing and the manufacture of cotton-making machinery are allied to the cotton trade. At St. Helen's, Widnes and Runcorn, glass and chemical manufacturing, based on Lancashire coal and Cheshire salt, are carried on, whilst at Warrington and Port Sunlight (in Cheshire) there are important soap works.

Liverpool, the second port of Britain, is the great port for the whole region, which indeed forms part of its natural hinterland. From the east-coast ports of Ireland, Liverpool imports dairy produce, which finds a ready market in the cotton manufacturing towns; from the West Indies tobacco and sugar, which are manufactured or refined locally; from North American ports, meat, wheat, timber and raw cotton; and from West African ports palm oil and kernels, rubber and ivory (see Fig. 26). *Birkenhead*, on the south bank of the Mersey opposite to Liverpool, has great shipbuilding yards.

Manchester, since the construction of the Ship Canal in 1894, has been a seaport, and has a large and steadily increasing trade, but it has not displaced Liverpool from its position as the chief cotton port. Manchester is really a great warehouse to which the manufactured goods from the surrounding towns are sent by road and rail for storage and sale.

II. *The Cumberland Coalfield*.—This is one of the

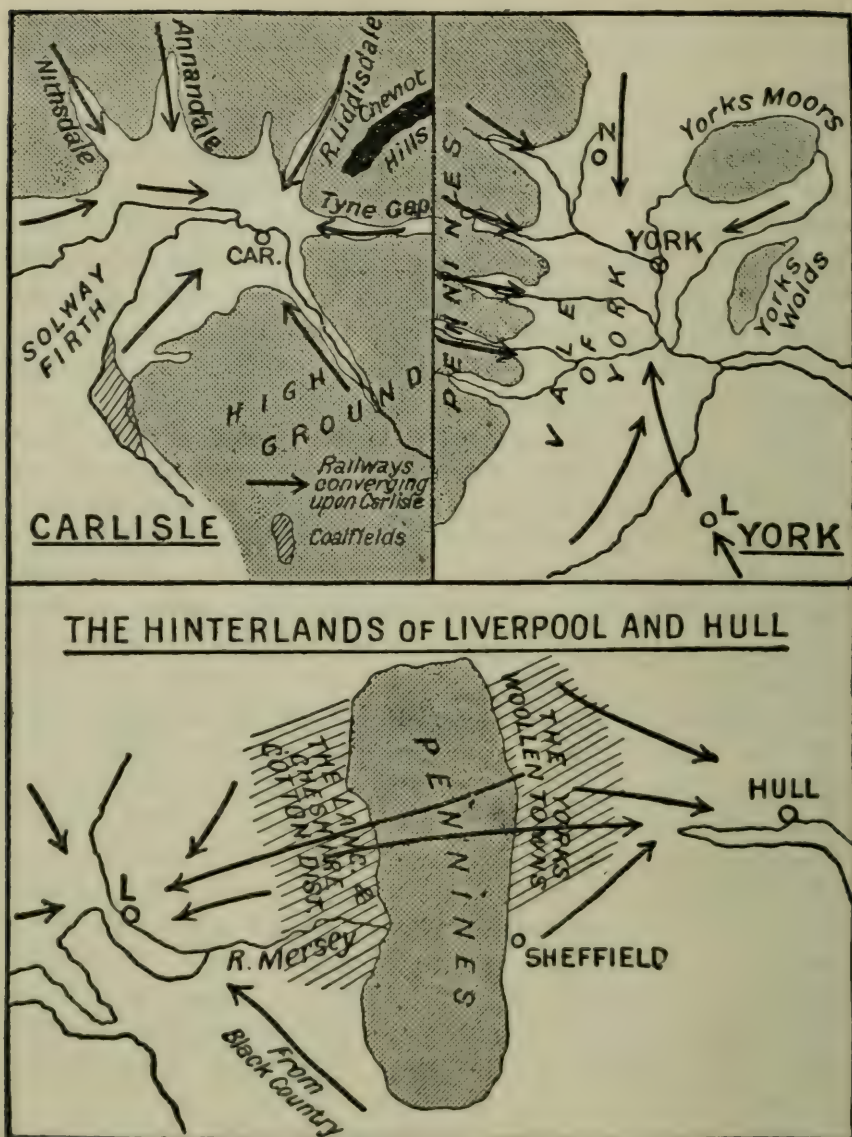


FIG. 26.—Sketch maps to illustrate the advantages of site possessed by Carlisle, York and Liverpool.

smallest of the British coalfields. It lies along the coast between Whitehaven and Maryport for a distance of about fourteen miles. The coal seams stretch out under

the sea as do many of the mine workings. Some of the coal is used at *Workington* in the smelting of iron ore, but most of it is exported from *Whitehaven* and *Maryport* to Belfast, the Isle of Man and Barrow.

Barrow is in the Furness district of North Lancashire and has grown with great rapidity, for about seventy years ago it was a small village. The Furness district has rich deposits of excellent grade iron ore, known as hematite, but the local supply has to be supplemented by ore imported from abroad, especially from Spain. Barrow's chief industries are shipbuilding and the manufacture of armaments.

III. *The Northumberland and Durham Coalfield*.—This coalfield is largely engaged in the iron industry. Most of the iron required is either brought by sea from the *Cleveland Hills*, outliers of the Yorkshire Moors, which produce about two-fifths of the total British output, or is imported from abroad, for only a relatively small amount of iron is now mined on the coalfield itself. Deposits of salt have led to the establishment of great chemical industries both at Middlesbrough and along the Tyne. The most important branches of the iron and steel industries are shipbuilding and general engineering (ships' engines, locomotives and railway stock, steel rails, bridges, etc.). Nearly half of the total tonnage of new English-made ships is accounted for by the ports of this coalfield. The chief yards are at *Newcastle*, *Jarrow*, and other towns along the lower Tyne, which has been deepened to permit of its navigation by large ocean-going ships; at *Sunderland* at the mouth of the Wear; and at *West Hartlepool* north of the mouth of the Tees. Newcastle is also engaged in chemical industries, whilst *Darlington* is the engineering centre for the North-Eastern Railway, and *Middlesbrough* the great smelting centre for the iron ores of the Cleveland district.

Enormous quantities of coal are exported from this coalfield, not only by sea to London, but also to countries across the North Sea.

IV. *The Yorkshire, Derby and Nottingham Coalfield*.—In point of output this coalfield, which extends from

the Aire to the Trent, ranks first in Britain. It is mainly associated with textile and iron and steel trades.

The Yorkshire Woollen Trade.—The establishment of this important industry has been largely determined by geographical conditions. The Pennines have always been noted for sheep-rearing, whilst the excellent water supply provided power and the means of cleansing and dyeing the wool, and thus assisted the early establishment of hand spinning and weaving. Later, the development of the iron and coal wealth led to the growth of great manufacturing towns where more woollen goods are manufactured than in any other district in the country. In order to meet the modern demands wool has to be imported from Australia, New Zealand, South Africa and Argentina. The centre of the Industry is *Leeds*, a city specializing in the making of ready-made clothes. It has also linen, iron and steel, and other industries. *Bradford*, *Halifax* and *Huddersfield* are largely engaged in manufacturing worsteds, and *Batley* and *Dewsbury* produce great quantities of shoddy (made from old woollen goods collected from all quarters, and then torn to shreds and re-manufactured).

We have already learned that *Liverpool* is a western outlet for the exportation of Yorkshire woollen goods, and that it also receives raw wool for manufacture. The eastern ports are *Hull* and *Goole*, of which the former is by far the more important. It is the third port of Britain, and occupies an excellent position for trading with continental North Sea and Baltic ports. It imports large quantities of timber and is one of the chief towns engaged in the Dogger Bank fisheries. It is also the chief of the eastern ports shipping to continental ports the cotton goods of Lancashire (see Fig. 26).

South of the woollen manufacturing towns, and centred round *Sheffield*, famed for its cutlery, lies an engineering district producing iron and steel goods. The presence of iron and wood, the latter for smelting, made *Sheffield* steel goods important before the days of coal. Now, even most of the iron smelted is brought from other British iron districts as well as from Spain

and Sweden. Other advantages possessed by Sheffield are the abundant supplies of limestone, the flux in smelting, of moulding sands, and of millstone grit which makes excellent grindstones. Its manufactures include cutlery, ordnance, tools, armour plate, engineering plant and machinery.

At *Derby* and *Doncaster* there are large railway engineering works, at the former those of the Midland Railway, and at the latter those of the Great Northern, whilst at *Nottingham*, which stands on the Trent at the extreme south-east corner of the coalfield, lace and hosiery are made from cotton. Nowhere else in Britain are cotton goods manufactured in a climate which is so dry as that of Nottingham, but it must be observed that the threads used for lace and hosiery are much stronger than those used in the manufacture of Lancashire goods, hence the location of this industry in a relatively dry district.

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AGRICULTURAL AREAS.

The chief agricultural region is the fertile *Vale of York*. This rich plain, which is about 40 miles broad in the south and narrows to about 10 miles in the north, is one of the most fertile districts in the country. Lying to the sheltered leeward side of the Pennines the region is dry and warm enough for wheat, though this cereal, except in the East Riding, is not grown to the same extent as in the Eastern Counties. Oats, barley and root crops are grown, whilst the fine grazing grounds have led to horse-rearing being important, especially in the north and east. If proof were wanted of the importance of the Vale of York even in the middle ages it may be found in the number of abbeys, monasteries and cathedrals which were established there. The chief agricultural and market centre is *York* (see Fig. 26). This city, whose site was realized to be of importance even in Roman times, is built at a convenient crossing and bridging place at the head of the tidal waters of the

Ouse. It commands, (i) the routes entering the Vale of York from the south, either along the Trent via Newark and Gainsborough, or through the Lincoln gap made by the Witham in the oolitic scarp; (ii) the route from the north via the narrowest part of the plain, where stands Northallerton, an important market centre; (iii) the route from the east coast following the Derwent and the Vale of Pickering; (iv) the routes from the west following the dales of the Pennine streams. In connection with these latter routes note the line of towns—Richmond, Ripon, Harrogate (the famous spa town), Leeds, Huddersfield and Sheffield—all standing where their respective rivers leave the uplands for the plain.

Of the other eastern agricultural regions *Holderness*, formerly well-wooded, but now largely cultivated except where marshes are found, and the *Vale of Pickering* are the most important. Holderness is also noted for horse-breeding.

The lowlands west of the Pennines, *i.e.* the broad lowlands of Lancashire, the narrower Westmorland and Cumberland coastal belts and the Eden valley, are all very fertile, but, owing to the wetter climate, they are better suited for cattle-rearing than for the growing of cereals. Therefore, on the western plains dairy-farming is more important than agriculture, although root crops are produced in considerable quantities.

CHIEF ROUTES.

A very close connection exists between the relief and the lines of communication (see Fig. 27). The railway routes proceeding to Scotland pass along the plains east and west of the Pennines. The west coast route is compelled to cross Shap Fell, a task that is not accomplished without difficulty. The route of the Midland Railway keeps to the eastern side of the Pennines until the valley of the Aire is reached. It then utilizes the Aire Gap as a means of crossing to the western side of the Pennines, and after having negotiated Shap Fell, proceeds along the Eden valley to Carlisle. The latter city

is a very important railway centre, as is shown in Fig. 26. A railway—the North-Eastern—following the depression of the Tyne Gap gives communication between Carlisle and Newcastle.

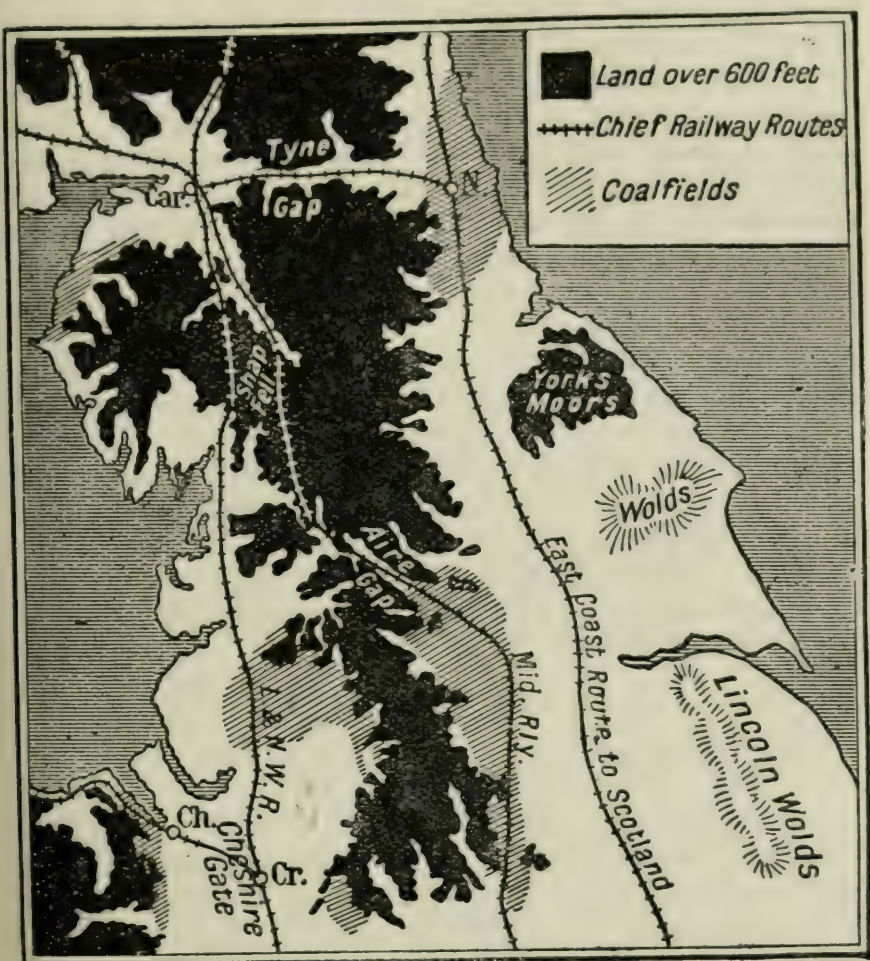


FIG. 27.—Relief, Coalfields and Routes of Northern England.

In all these routes we see a very close connection between routes and relief. But other important routes must be noticed, and if the control is not so obvious, it none the less exists and should be studied on large-scale maps. In almost every case the modern railway follows

the older roads, and they in turn the still older pack-horse routes. The Lancashire and Yorkshire Railway connects Liverpool with Hull and Goole, and has to face steep Pennine gradients which make it necessary to employ engines capable of great haulage power. After passing through Rochdale and Todmorden, where it effects a junction with a line from the weaving towns of the Ribble valley, the main line makes use of the upper valley of the Calder and proceeds to Halifax. The London and North-Western Railway between Manchester and Huddersfield utilizes the Tame and Colne valleys. Both of these important routes are more difficult than those using the Aire and Tyne Gaps, and considerable tunnelling was necessary in the construction of each, but despite this they are both followed not only by roads but even by canals. A canal giving water connection between Liverpool and Leeds makes use of the Aire Gap. The Great Central Railway between Sheffield and Manchester follows the Don valley, and in this case it was necessary to construct the famous Woodhead Tunnel. Further south the Midland Railway from Derby traverses the beautiful Peak country by means of the Wye valley, and reaches Manchester via Stockport and the upper Mersey.

THE ISLE OF MAN.

This island lies in the Irish Sea almost equidistant from Ireland, Scotland, England and Wales. Except in the north, where there is a low alluvial plain of recent formation, the structure and relief of the island are comparable to the other highland regions which lie on the Irish Sea margins. The highest point is Snaefell (2,034 ft.). The leading industries are fishing, centred at Peel on the west coast, stock-rearing and some lead-mining. The beautiful scenery and the ease of access (via Liverpool and Fleetwood) make the island a very favourite holiday centre, especially for the inhabitants of the Lancashire cotton towns, thousands of whom make their holiday headquarters at Douglas and Ramsey, but especially at the former. The Isle of Man enjoys legislative

independence, and is governed by its own Parliament, the House of Keys (see also p. 93).

SCOTLAND.

THE SOUTHERN UPLANDS.

Physical Features.—This part of Scotland is a dissected plateau, tilted south-eastwards, so that most of the rivers flow in that direction, except in the east, where the Tweed and some of its tributaries flow eastwards. The only plains are along the coastal margins, and in the valleys of the rivers. The plains at the head of Solway Firth are separated from those in the valley of the Tweed by a ridge which attaches the Cheviot Hills to the main mass of the Southern Uplands. The Cheviots are unlike the latter, for they are mainly composed of granite and volcanic rocks. Their culminating point, the Cheviot (2,676 feet), is a mass of volcanic rock which has been laid bare by denudation. In the east of the Southern Uplands there is a series of south-west to north-east high ridges separated by deep troughs which have been cut by rivers. Thus we have the Cheviots followed by the Tweed-Teviot trough, which is succeeded by the ridge formed by the Moorfoot and Lammermuir Hills. North of this the trough of the river Esk is followed by the Pentland Hills, which are not, however, part of the Southern Uplands unit.

The Border.—Before Scotland and England were united the Border Country was the scene of constant strife. In the west the boundary line runs along the Solway Moss, now drained, but in former times offering a by no means easy crossing. In the centre the line follows the Cheviots, and in the east the Tweed. It is obvious that of the three parts of the boundary, the easiest to cross in olden days was the Tweed. Thus arose the association of a journey from England to

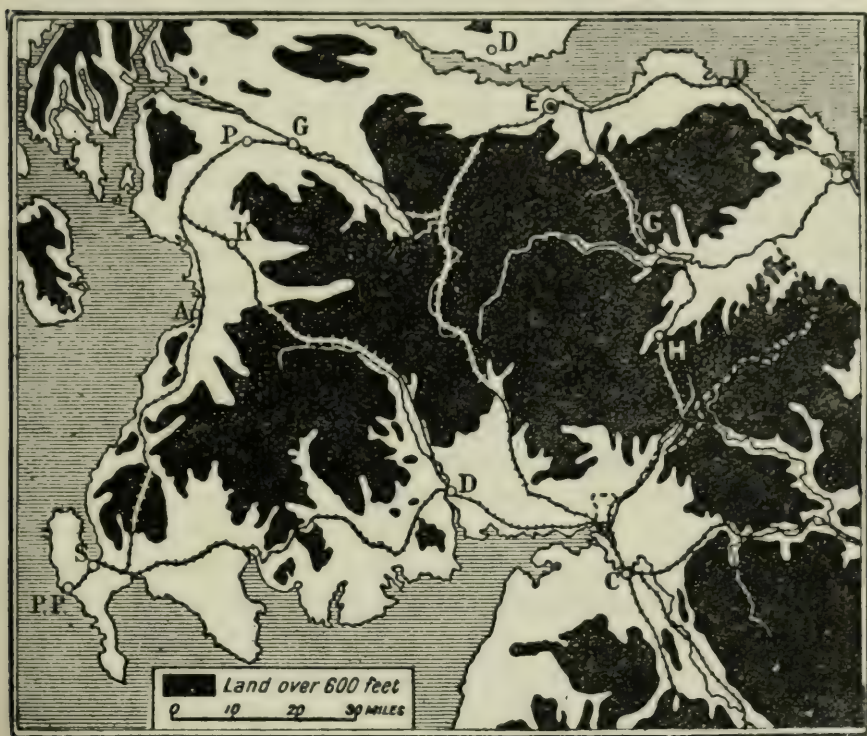
Scotland, or from Scotland to England with the crossing of the Tweed. Thus, too, most of the border fights occurred along the eastern portion of the frontier, *e.g.* Flodden, but also note Solway Moss, both in the reign of Henry VIII. The old Roman Wall, built to keep the Pict and Scots out of England, followed the line, but not the floor, of the Tyne Gap.

Chief Occupations.—The Uplands have heather and coarse grass moors and peat mosses on their higher parts, but their lower slopes are covered with grass. Woodlands are only found in the valleys owing to the porous nature of the limestone of which most of the area is composed. The region has thus become one of the most important sheep-rearing parts of Britain. In the counties of Berwick, Selkirk and Roxburgh there are more than 1,000 sheep per 1,000 acres. The sheep-rearing industry was the means of establishing in the valley of the Tweed, where water power was available, the manufacture of the noted woollen cloths which bear the name of the river. The chief woollen towns are Peebles, Galashiels, Selkirk and Hawick. Coal, iron and machinery are now imported from the Lanark coalfield.

The coastal lowlands and the river valleys are very fertile, hence the number of old abbeys whose monks cultivated the soil: *e.g.* Kelso, Melrose, Jedburgh, etc. Agriculture and dairy-farming are important occupations.

Routes.—These are of great importance, because the Uplands are a barrier set in the way of routes coming northwards from England to the Central Lowlands of Scotland, which is the most important and the most densely peopled part of the country. We have here many excellent examples of the value of coastal plains and of river valleys as means of communication (see Fig. 28). The *East Coast Route* from England crosses the Tweed, and, except where it avoids the highlands of St. Abbs Head, proceeds along the narrow coast plain, passing through Dunbar, where Cromwell gained a great victory, on its way to Edinburgh. From Carlisle three routes enter Scotland (see Figs. 26 and 28). The

first is known as the *Waverley Route*, as it traverses the country immortalized by Sir Walter Scott. Leaving Carlisle the route first follows the valley of the Liddel, and, after negotiating the ridge which attaches the Cheviots to the Southern Uplands, enters Teviotdale. From Teviotdale the line passes to the valley of the Tweed, and at Galashiels strikes along the valley of the



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FIG. 28.—Southern Uplands. Relief and Routes.

Gala, and utilizes the gap between the Moorfoot and the Lammermuir Hills as a means of attaining the east coast plain and Edinburgh. The second route gives the shortest route between Carlisle and Glasgow, for it will be noticed on the map that the two river valleys used by the route (Annan and Clyde) are practically in a straight line. After leaving Carlisle and rounding the head of Solway Firth the line strikes Annandale, and, leaving Hart Fell on the right, it crosses Beattock

Summit, and descends to the valley of the Clyde, leaving Leadhills, the highest permanently inhabited village in the British Isles, on the left. From *Carstairs*, an important junction, a branch line runs along the northern margins of the Pentland Hills to Edinburgh, the Glasgow line continuing along the Clyde valley to its destination. The third line from Carlisle traverses the Solway lowland to *Dumfries*, the most important of several market centres, standing where the routes along the coastal plain meet those coming down the river valleys of the eastern Southern Uplands. From Dumfries, the valley of the Nith, Nithdale, leads to Kilmarnock, in the Ayrshire lowlands. Between Kilmarnock and Glasgow the main line utilizes two small valleys in passing via Barrhead through the Lanark Hills. Other lines utilize (1) the *south coast plain* for a line giving connections between Carlisle, Dumfries and Stranraer; (2) the *west coast plain* for a route from Glasgow to Stranraer. *Stranraer* is an important packet station for Ireland, its steamship connection with Larne giving the shortest sea passage (35 miles) between Great Britain and Ireland.

THE CENTRAL LOWLANDS.

Physical Features.—This part of Scotland is a rift valley, about 50 miles wide, let down between two parallel faults. The sinking of the ancient rocks, which before the formation of the rift valley connected the Southern Uplands with the Highlands, produced a floor upon which more recent deposits have been laid. Even these more recent deposits have been so fractured, folded and worn down that the present surface is marked by great variety, both in relief and in structure. The soils derived from these various rocks have been intermingled by glacial and river action, and thus we find that many parts of the central lowlands are noted for their great fertility. South of the fault which marks the somewhat abrupt wall-like termination of

the Northern Highlands, there is a long, narrow plain composed of Old Red Sandstone, and known in the east as *Strathmore* (= the great valley). South of this plain lies a line of volcanic hills parallel to the margin of the Highlands and separated from each other by broad river gaps (see Fig. 29). These hills are the Renfrew Heights, the Campsies, the Ochils and the Sidlaws. South of this line of hills we find three clearly marked basins: (1) the Ayrshire plain, (2) the basin of the Clyde, (3) the lower basin of the Forth. The importance of these basins is very great, for in them the coal measures have been preserved from denudation, whilst they have been worn off the upfolds which separate the basins from each other.

Chief Industries.—The Central Lowlands are the most important industrial part of the country, and although of comparatively small area, support about three-quarters of the total population. The reasons for this are: (i) the richness of the soil, (ii) the presence of extensive coal and iron deposits. Generally speaking, the hills are devoted to pastoral occupations and the lowlands to agriculture; but, as should be expected, there are important differences between the eastern and the western counties, due to the heavier rainfall of the latter. This makes the western counties less important for cereals and more important for pastoral pursuits than the eastern counties. Thus, Fifeshire and Haddingtonshire grow about one-third of the total wheat crop of Scotland, whilst cattle are important in the west and sheep in the east. Fruit-growing is very important in Strathmore and the Carse of Gowrie.

Of the three coalfields, the *Central, or Lanark Coalfield* is the most important, for nearly half the total Scottish output is mined there. On the central coalfield, which includes the coalfields of Stirling and Linlithgow, the presence of iron has made iron and steel trades pre-eminent. *Airdrie, Coatbridge, Motherwell, and Wishaw*, all in Lanark east of the Clyde, and *Falkirk* in Stirlingshire, are the great smelting and engineering centres. *Paisley*, west of Glasgow, is the centre of the cotton industry,

and specializes in cotton and linen thread. *Greenock* has sugar refineries, whilst shipbuilding is carried on in the yards of *Glasgow*, *Port Glasgow*, *Dumbarton* and *Greenock*. The lower Clyde is now the most important shipbuilding centre in the whole world, and its shipyards are responsible for the construction of nearly one-third of the total British tonnage, as well as for large numbers of ships for other countries.

The chief town of the whole coalfield is *Glasgow*, which, even before the days of coal and iron, was an important centre at the meeting-place of routes from the south, east and north. Later its favourable position for trading with the eastern shores of America made it necessary to deepen the river so as to accommodate the ocean-going ships. This was accomplished in 1768, since which date the city has grown so rapidly that it is now the second largest in the British Isles. Besides shipbuilding and steel trades, Glasgow has important chemical and pottery industries. A canal constructed in 1790 from Glasgow to Grangemouth across the narrow neck of land between the Firths of Clyde and Forth, gives the port a water outlet to the North Sea. Unfortunately, however, it is very small and can only be used by small boats. Whenever the long-talked-of ship canal is completed, it will give Glasgow an additional importance, for it will then be put into direct communication with continental Europe.

The Ayrshire Coalfield exports large quantities of coal from *Ardrossan*, *Troon* and *Ayr* to Belfast and other Irish towns. At *Kilmarnock*, the chief manufacturing centre, there are engineering and woollen industries.

The Eastern (or Fife, Edinburgh and Haddington) Coalfield extends under the Firth of Forth, and has until recently been of least importance, but in the future it is destined to play a greater part, for it is estimated that of the total available quantity of coal existing in the Scottish coalfields about half lies in the eastern basin. In Fifehire the chief manufacturing centres are *Dunfermline*, which makes linen goods, and *Kirkcaldy*, which manufactures oilcloth from jute imported from India,

and linoleum from cork imported from Spain. Much of the coal is exported from Burntisland and Methil to Norway and Baltic countries. South of the Forth there are no large industrial centres, but Edinburgh is noted for its brewing, distilling and printing trades, whilst paper-making is carried on in many of the neighbouring villages.

Dundee, the largest industrial centre in eastern Scotland, lies north of the eastern coalfield, on the north bank



FIG. 29.—The Central Lowlands of Scotland.

of the estuary of the Tay. Its industries include the manufacture of hemp, jute and coarse linen goods, fruit-preserving and jam-making (Carse of Gowrie). Hemp and flax are imported from Baltic countries, but the jute comes from Calcutta. It is also a shipbuilding centre and one of the headquarters of the North Sea fishing and Arctic whaling fleets. Similar industries are carried on to a smaller extent at *Arbroath* and *Montrose*.

Routes.—It is obvious from a study of a relief map that there are many towns in this part of Scotland

which must be important owing to the convergence of routes upon them. Thus, *Stirling*, which is in the gap between the volcanic Campsies and Ochils, very early became important because it possessed the advantages of being at a point where the Forth could easily be bridged, and also of being at the head of the river navigation. Formerly its ancient castle, built on an isolated volcanic plug, dominated this gate to the Highlands. *Perth*, in the gap between the Ochils and the Sidlaws, has similar advantages with regard to its position on the Tay. Until the construction of the bridges across the Firths of Forth and Tay the only easy routes to the north passed through *Stirling* and *Perth*, and although the direct route to the east coast does not now pass through them, they are still gate cities to the Highlands. *Dumbarton*, which, like *Stirling*, has an ancient castle built upon an old volcanic plug, commands the routes proceeding to the north between the Campsies and the Firth of Clyde. Another important site is that of *Edinburgh*, the beautiful capital and premier university city of Scotland. The city grew up on the hilly ground surrounding its castle, a third example of a castle built on an isolated volcanic plug or neck. (Bass Rock, at the entrance to the Firth of Forth, is another volcanic neck.) The position of the city, in the narrow plain between the Pentland Hills and the sea, gives it the control of the routes along the coastal plains, as well as of that which reaches it from the middle Tweed valley via the Gala. *Leith*, its port, imports the grain, esparto grass, and wood pulp for the capital's brewing, distilling and printing industries.

Leaving *Edinburgh*, the East Coast Route from England proceeds westwards to Queensferry, where it crosses the Forth estuary by means of the magnificent Forth Bridge, whose length is a mile and a half. On the north bank of the Forth stands Rosyth, an important naval base. The line then crosses Fifeshire, passing through *Kirkcaldy* and *Cupar*, the county town of Fife and an important agricultural centre. A branch line runs to St.

Andrews, a university town, an old ecclesiastical capital, and a noted golf and holiday centre. Reaching Dundee by means of the Tay Bridge, it follows the east coast plain to Aberdeen, via Arbroath and Melrose.

THE SCOTTISH HIGHLANDS.

Physical Features.—The Highlands are the remnants of a plateau of ancient crystalline rock which has been dissected by rivers and profoundly modified by ice action. They are separated into the Northern Highlands and the Grampian Highlands by the long and narrow rift valley of Glen More (= great glen), three-fifths of whose floor is occupied by lakes which were artificially linked together in 1823 to form the Caledonian Canal. Everywhere the evidences of ice action are manifest. Scratched and polished rocks abound ; most of the lakes have been made, either by the damming of a valley by the placing of morainic material across the course of a river, or by the scooping out of rock basins, whilst the west coast abounds in fiords, called firths or lochs, made by the sinking of former river valleys which had been deepened by glaciation.

It will be noticed that in both the Northern and the Grampian Highlands the ancient plateau from which they have been formed was roughly tilted towards the south-east. This is seen in the trend of the river valleys. In the Grampian Highlands, however, there are a number of well-marked valleys running at right-angles to this direction, *e.g.* Findhorn, Spey and upper Tay. In the Southern Uplands we noticed a similar feature in the eastern part of that region. In both cases the rivers have cut their valleys in less resistant rocks, which appear at the surface in long N.E.–S.W. bands or belts.

The prevailing highland landscape consists of treeless moors, covered by peat bogs, heather, bracken and poor grass, above which tower the rounded mountains whose higher slopes and summits are almost, if not quite, devoid of vegetation. In the river valleys or glens there is a greater variety of vegetation, and coniferous and decidu-

ous trees are found. There, the graceful silver birch, the beautiful lakes, the rushing, peat-coloured rivers, and the gorgeous colours of the ferns, mosses, heather and flowers, give such magnificent scenery that they are visited by thousands of tourists, who form one of the chief sources of revenue in a land not otherwise richly endowed by nature. The best-known region is the *Trossachs*, immortalized by Scott in his poem, "The Lady of the Lake." It is situated around Loch Katrine, in south-west Perthshire.

Chief Occupations.—There is a great contrast between the east coast plain and the rest of the Highlands. The plain, which is composed of relatively soft Old Red Sandstone, except where the Grampians reach the coast in Aberdeenshire and Banffshire, has fertile soil, warm summers and a moderate rainfall, so that it is favourable to agriculture. Oats and barley are grown, and large numbers of cattle are reared. In the mountainous parts the low temperature of the exposed high moorlands, the poverty of the natural vegetation, and the thinness and barrenness of the soil, make the Highlands of small economic value, for they are unsuitable for agriculture and of little value for pastoral purposes. Neither sheep nor cattle are really suited to the Highland pastures, and although both are reared, their numbers per 1,000 acres are less than the average for the British Isles. The Highland peasants, or crofters, cultivate small patches of root-crops and oats, and rear sheep and the shaggy-coated, long-horned, highland cattle, as well as hardy mountain ponies. But both men and domesticated animals are decreasing in numbers, and more and more cultivated land is becoming permanent pasture, not, however, for cattle or sheep, but for deer.

Round the coasts fishing is everywhere an important occupation, but is naturally chiefly carried on from east coast ports which face the North Sea fishing grounds, and where there is not only a large population, but easier railway facilities for dispatching the fish to the populous lowlands. Wick, Peterhead and Aberdeen are the leading fishing centres, the last-named being

only second in importance to Grimsby as a trawl-fishing port. Kyle of Lochalsh and Mallaig, both on the west coast, receive the catch from the Western Isles for dispatch by rail to the east coast or the central lowlands.



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FIG. 30.—The Highlands. Relief and Routes.

At Aberdeen and Peterhead the quarrying of granite is an important industry. The quarries are close to the sea, so that the granite can be cheaply shipped to east coast towns.

Routes and Cities.—The east coast plain is followed by railway from Dundee to Aberdeen (see Fig. 30). *Aberdeen* stands between the mouths of the Dee and the Don, and has a fine harbour protected by breakwaters, at the mouth of the former river. It thus commands the traffic up and down these valleys and that passing along the coastal plain, whilst it is in a very favourable position for engaging in the Dogger Bank fisheries. It is also a university city and an important cattle market and quarrying centre. A branch line follows the Dee as far as Ballater, from which coaches run to Balmoral, the favourite royal residence in the Highlands. Leaving Aberdeen the main line does not follow the coast of the low, blunt Buchan peninsula, but utilizes the Don and other valleys to take a short cut to Elgin. *Peterhead* has granite and fishing industries. From Elgin the main line continues via Nairn to Inverness, often called the Capital of the Highlands.

Inverness (= mouth of Ness) occupies a splendid position where several routes meet, and is thus of considerable importance. It commands routes from (i) the east via the coast plain, (ii) the south-east, from Perth via the Drumochter Pass and the Spey (Highland Railway), (iii) the south-west, via the road and the Caledonian Canal, (iv) Wick and the north via the coast plain. It has also access along the Moray Firth to the North Sea. Throughout the whole of Scottish history the fertile Moray Firth lowlands, for which it is the centre, have played a very important part. Leaving Inverness the east coast line proceeds through Dingwall, at the head of Cromarty Firth, and at Bonar Bridge, at the head of Dornoch Firth, leaves the coast, to which it soon returns however at Golspie. At Helmsdale it again strikes inland along the valley of the Helmsdale River, and finally reaches the coast at the fishing ports of Thurso and Wick.

Perhaps the finest views obtainable in Britain from a railway carriage window are to be seen on the Highland Railway between Perth and Inverness. Leaving Perth

this line follows the valley of the Tay and its tributary the Garry, and thus traverses some of the finest parts of the Grampians. It goes through the narrow Pass of Killiecrankie, and later has to negotiate the great mountain barrier extending from Ben Nevis to Cairn Gorm. This it does by means of the Drumochter Pass (1,500 feet), which gives access to the upper Spey valley. Leaving the Spey, the line rounds the Monadhliath Mountains (pronounced Monalia), which lie between the Spey and Glenmore, and cutting across the Findhorn and Nairn valleys finally reaches Inverness.

The west coast is reached by railways at several points. *Mallaig* and *Strome Ferry* are fishing ports of considerable importance, depending very largely upon the fast trains which carry the fish to the populous centres. For most purposes the land routes from Glasgow to Oban and other west coast towns are so difficult that the sea route is largely adopted. This is shortened by the Crinan Canal, cut through a depression at the head of the Kintyre peninsula.

The importance of Glenmore and of the Caledonian Canal which traverses it, is lessened by the fact that it does not connect large centres of population. When the canal was built it was hoped that it would do much to check the depopulation of the Highlands, but it has not had this effect and is now chiefly used by small tourist vessels. It is not even followed by a railway throughout its whole length.

THE ISLES OF SCOTLAND.

The Orkneys and Shetlands.—The Orkneys are separated from the mainland by the Pentland Firth, through which the tidal waves form a strong *race* which is troublesome to shipping. Like Caithness, the Orkneys are composed of Old Red Sandstone arranged in horizontal layers. The sea has cut back both the mainland and the islands, so that in many places there are high perpendicular cliffs. One isolated stack, known as the Old Man of Hoy, is about 600 feet high. On the whole,

however, the Orkneys are low. The Shetlands consist of old, hard, crystalline rocks like the Highlands, and are bold and rugged. Sheep- and pony-rearing in the Shetlands and cattle-rearing in the Orkneys, agriculture in the Orkneys, and fishing in both, are the leading occupations. *Kirkwall*, on Mainland, the largest of the Orkneys, is a steam-trawling centre. *Lerwick*, on Mainland, the largest of the Shetlands, is also a fishing centre. The Great European War gave to these groups of islands a considerable strategic importance, for they formed one of the chief bases of the British Fleet engaged in blockading the broad northern entrances to the North Sea. They are stepping-stones to Norway, and are remnants of a former highland mass which stretched from Britain to Scandinavia.

The Outer Hebrides.—These islands are separated from Skye and the mainland by the Little Minch and the North Minch. They have the appearance of a kite with a long, straggling tail. Geologically they are the remnants of some of the oldest rocks on the earth's surface, and although they have been worn down to a rough plain, or peneplain, they are not fertile. Their surface is studded by many bogs and lakes, most of the latter being due to the action of ice sheets. The islands act as a natural breakwater, so that the enclosed seas are relatively calm and abound in fish. Fishing is the chief industry of the inhabitants, and Stornoway, in Lewis, is the centre of the industry. The fish are sent to Kyle of Lochalsh, from whence they are hurried to the markets by rail. Agricultural and pastoral pursuits are also engaged in.

The Inner Hebrides.—In these islands, which stretch from Skye to Islay, the ancient rock has been largely covered by great sheets of basalt, a volcanic rock, which in a liquid state must have flowed considerable distances before cooling. When cooling occurred, however, it took place rapidly, and the resulting contraction produced the famous columnar structure seen in the Isle of Staffa at Fingal's Cave and at Giant's Causeway in north-eastern Ireland. It is believed that long ago the sheets

of basalt which now cover most of the Inner Hebrides, formed, with the sheet covering Antrim, one vast continuous mass.

The industries of the Inner Hebrides resemble those of the Outer Hebrides. *Portree*, in Skye, is a small fishing centre, but most of the fish caught in these waters are sent to the eastern and southern markets, from Mallaig and Kyle of Lochalsh.

The Islands in the Firth of Clyde.—These are the islands of Bute and Arran, which form the county of Bute. The islands are not very productive, but are popular holiday resorts. *Rothsay*, standing on a beautiful bay in the Kyles of Bute, the strait between Bute and the mainland, is the most important town.

The tide of early Scandinavian conquest by sea gradually spread along the island stepping-stones of the Faröes, Shetlands and Orkneys; and thence after the rounding of Cape Wrath (=the corner cape), via the Outer and Inner Hebrides, to the Isle of Man, which came under Norwegian rule at the end of the ninth century. The Isle of Man and the Hebrides remained Norwegian until 1266, when they became Scottish, but Scotland did not obtain possession of the Orkneys and the Shetlands until 1468. It is, therefore, not to be wondered at that the Scandinavian element in the latter islands is still strong.

IRELAND.

Ireland, which is rather larger than Scotland, is separated from Great Britain by the North Channel, the Irish Sea, and the St. George's Channel. But Ireland was not always physically separated from Great Britain, for to a large extent her structural divisions are clearly prolongations of those of her neighbour (see Fig. 20). For example, rocks similar to those of the Southern Uplands are seen in the Mourne Mountains area, and again rise above the level of the plain in the Slieve Blooms. The old, hard rocks of north-western and western Ireland are prolongations

of those of north-western Scotland. The volcanic plateau of Antrim resembles the Inner Hebrides, whilst the south-eastern mountains are extensions of those of north and central Wales, and the south-western mountains find their counterpart in southern Wales and the English south-western peninsula.

THE CENTRAL PLAIN.

Physical Features.—The Central Plain of Ireland covers about one-third of the total surface, and is composed of sheets of carboniferous limestone (see Fig. 20) which have been practically undisturbed. It will be recalled that the Pennine Chain is built of the same rock, but in its case the limestone and the measures above it had been thrown into a great fold. It is very probable that the Central Plain of Ireland was also formerly covered by layers of rocks belonging to the coal measures. These, however, have been worn away by weathering and carried off by the rivers except in one or two small basins. But the surface does not by any means present a perfectly flat appearance. It is gently undulating, the lowest land being in the river valleys, and although most of the water-partings exceed 250 feet there are only a few places where 500 feet is exceeded. The limestone is covered by an almost continuous sheet of boulder clay deposited by the ice sheets which once covered the land. The clay deposits are, however, not so prevalent west of the Shannon as in the eastern part of the plain, and therefore the western plain is poorer and less fertile. The surface of the Central Plain is dotted by small, moraine-dammed lakes, but most of the large lakes occupy hollows produced by the solution of the limestone.

Bogs.—One-eighth of the total area of Ireland is covered by bogs, of which the largest and best known is the Bog of Allen, chiefly in King's County east of the Shannon. Bogs are soft, saturated and spongy areas in which much decaying and decayed vegetable matter is present. They form in shallow, stagnant lakes

or on cold, damp, mountain surfaces. In the former places they are largely produced by sphagnum, a moss

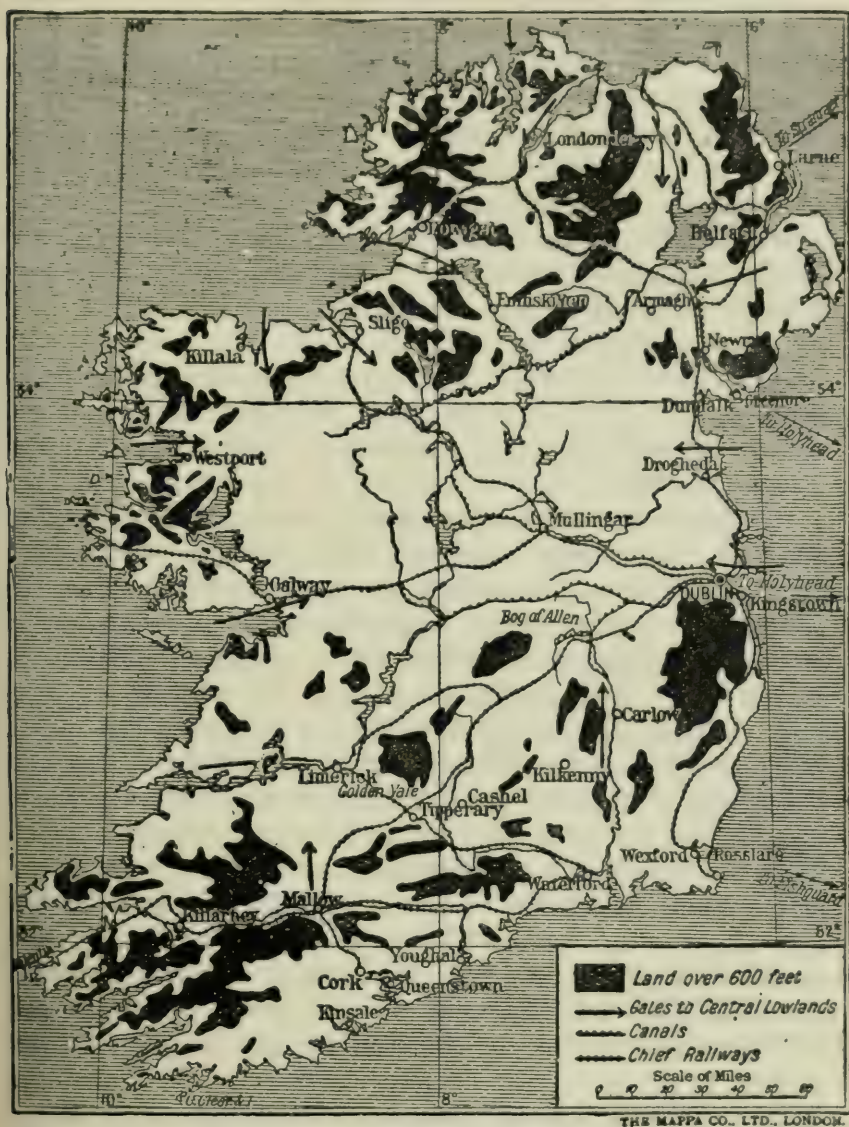


FIG. 31.—Ireland. Relief and Routes.

which will in time cover the whole surface of the lake, and finally fill it with decayed or decaying vegetation which assumes the appearance of a stiff fibrous mud.

This is called peat. The peat is cut into brick-shaped pieces, and then stacked until dry enough to be used as fuel whose heating power is about half that of coal. It is also used as a constituent in the manufacture of manures. In an almost coal-less country like Ireland peat is naturally extensively used for fuel.

One drawback of the bogs is the great hindrance they present to means of communication, for all main roads and railways must either avoid them or be built upon causeways resting on the solid rock below the bog. As this is frequently from 20 to 50 feet below the bog surface, the construction of roads and railways is a very extensive undertaking.

The hill-side bogs are liable to become swollen after heavy rains. This causes them to burst and to slide towards the valleys, often causing much loss of property and even of life.

The Shannon.—This river is the longest in the British Isles, but its importance is not very great, as it does not flow through populous districts, and its estuary opens to the west coast away from the sister isle of Great Britain, the market for most Irish products. Between Lough Derg and Limerick it cuts its way through a gorge at Killaloe, falling 100 feet in less than 20 miles. This forms a series of rapids which impede through navigation. A canal built round the rapids, however, surmounts this impediment and renders the Shannon navigable for river boats for about 200 miles.

The western boundary of the plain is marked by the chain formed by Lakes Conn, Mask and Corrib. The two last-named lakes are connected by an underground channel. The eastern part of the plain slopes to the Irish Sea, and is largely drained by the Boyne and the Liffey.

Chief Occupations.—Pastoral occupations are everywhere of greater importance than the tillage of the land. Not one-tenth of the whole is cultivated, but the percentage is greater in the drier east than in the wetter west. Oats and barley are the chief cereals, whilst the growing of potatoes is widespread, especially in the

west. The rich permanent pastures support large numbers of dairy cattle, and the rearing of pigs, fed on skimmed milk and potatoes, is also very important.

The Routes and Towns.—The most important routes are those which reach the east coast, where the plain extends the whole of the distance between the Wicklow Mountains to the south and the Mourne Mountains to the north (see Fig. 31). The reason for this is fairly obvious if the map is consulted, for on the one hand the east coast faces Great Britain, and on the other the great plain of England reaches the Irish Sea opposite the coastal extension of the Central Plain, a fact that has had no small influence upon history.

Dublin, standing on the Liffey at the head of Dublin Bay, occupies an excellent site, not only for the capital city, but also for the development of trade with Great Britain. Its excellent railway and road communications with all parts of the country, and its canal connections with the Shannon have made it at once the great collecting centre of the produce of the eastern Central Plain and the distributor to the same region of articles imported from Great Britain. Its position opposite Anglesey gives it the advantage of the shortest sea passage to England, whilst the large populations of the industrial districts of S.E. Lancashire and the Midlands form the chief markets for its exports. Dublin has also important brewing, distilling and poplin manufacturing industries. *Kingstown* is an outport of Dublin, and is the port for the mail steamers to Holyhead. *Drogheda* on the Boyne, and *Dundalk* on the bay of the same name, are also ports for the produce of the Central Plains, whilst both have linen and other manufactures. *Greenore*, near the entrance to Carlingford Lough, is a packet-station having connections with Holyhead. It forms the outlet for the small linen manufacturing towns and the agricultural district of the basin of Lough Neagh.

Athlone, on the Shannon, just south of Lough Ree, stands at an important crossing point, for the Shannon is generally broad enough to form an effective barrier.

The railway from Dublin crosses there on its way to *Galway*, a port which has declined in importance owing to the dwindling away of its former large trade with Spain. *Limerick*, at the head of the Shannon estuary, is the chief port of Western Ireland. If it had a rich industrial region for its hinterland it would undoubtedly be a port of first-class importance. Its hinterland, which includes the *Golden Vale*, a rich agricultural region stretching south-eastwards from Limerick to the upper basin of the Suir, as well as the basin of the Shannon, is chiefly pastoral. This accounts for the bacon-curing and tanning industries centred in the port, and for the large consignments of cattle and dairy produce exported to Great Britain. Lace-making is also carried on. *Sligo* stands where the plain reaches the sea between the mountains of Western and of North-western Ireland. It exports cattle and dairy produce.

THE HIGHLANDS OF WESTERN CONNAUGHT.

These highlands lie west of the Loughs Conn, Mask and Corrib chain of lakes, and like those of North-western Ireland, repeat the leading characteristics of the Scottish Highlands; but it must be noted that the Scottish Highlands are both more extensive and higher than their Irish counterparts. It is on account of the more broken character of the Irish mountains, and the relatively broad lowlands which separate them, that towns are more numerous and a larger number of people are supported than in the Scottish Highlands.

This part of Ireland is the poorest in the country. Its population is very small, and has been decreased by emigration. Pastoral occupations are carried on in the lowlands, and many cattle and pigs are raised, whilst some sheep are pastured in the highlands. The magnificent scenery of the Connaught and Donegal coasts has led to the region being visited by an increasing number of visitors, who form, although not to the same extent as in the Scottish Highlands, one source of revenue.

Extensive fisheries are not developed owing to distance from markets.

Westport, on Clew Bay, and *Killala* are small ports standing at the sea end of belts of lowlands which act as gates to the Central Plains (see Fig. 31).

NORTHERN IRELAND.

Physical Features.—Northern Ireland consists of highland masses separated by belts of lowland drained by rivers. On structural grounds Northern Ireland may be divided into a western part, where the N.E.—S.W. direction of the mountains and their crystalline and granitic character show them to be outliers of the Scottish Highlands, and an eastern part, where the lava-topped basalt plateau of Antrim has connections with the Inner Hebrides (see p. 92). The broad lowland of the river Bann separates the two regions. Lough Neagh (area 150 sq. miles), the largest lake in the United Kingdom, occupies a shallow basin, probably produced by the sinking of part of the basalt sheets. Note the number of streams draining into it. The soils produced by the disintegration of the volcanic rock are very fertile, and have helped to make the lowlands of the Bann and those surrounding Lough Neagh one of the best agricultural areas in the country, but the soils derived from the old, hard rocks of the west, as well as from those of south-east Ulster, where the ancient limestones of the Southern Uplands of Scotland reappear, are generally poor, and pastoral occupations predominate.

Chief Occupations.—Ulster grows about one-half of all the oats produced in Ireland, and practically the whole of the flax. As may be expected it is the eastern part where most of these articles are grown, for in the west the barren soil, the mountainous nature of the country, and the damp climate restrict the area which can be cultivated to about 12 per cent. of the surface. Dairy-farming and pig-keeping are carried on in all the lowlands and some sheep are reared on the hill pastures.

The most important industrial region in Ireland is Eastern Ulster. Here the great shipbuilding yards of *Belfast*, and the linen mills of Belfast and other centres, have developed without the aid of local coal and iron, for the output from the coal-mines at Dungannon, south-west of Lough Neagh, is very small indeed. Against these disadvantages must be placed the advantages of cheap land and an abundant supply of cheap labour. Coal is imported from Ayrshire, Cumberland and Lancashire, and iron and steel from many parts of Britain, but most conveniently from the Barrow and Cumberland iron districts. Belfast is particularly noted for the building of large passenger ships, and in its yards many of the world's largest vessels have been built, including the ill-fated *Titanic*. The manufacture of linen goods is naturally associated with the Ulster cultivation of flax, but the mills now obtain most of their supplies from Russia, Belgium and other foreign countries. Belfast has become the great centre of the trade for several reasons. Its climate and its water supply are especially suited for the bleaching of linen; its shipbuilding industry, being almost entirely a man's occupation, provides a large reservoir of female labour available for the manufacture of linen goods, whilst being a port it can readily receive raw materials from Great Britain or from foreign countries. The city has also important distilling and rope-making industries. *Londonderry* has shipbuilding and linen industries, but on a much smaller scale than Belfast. It is particularly noted for shirts. The manufacture of the shirting and the cutting out are carried on in Londonderry, but the sewing gives employment in many villages and small towns in Tyrone, Londonderry and Donegal. In Donegal, as in the Scottish Outer Hebrides, the hand-weaving of wool provides many people with the means of livelihood, and during recent years the industry has increased owing to the efforts put forward to increase the popularity of Donegal tweeds.

Routes.—The main roads and railways avoid the high-

lands and follow the river lowlands. Notice a group of towns which control the various "gateways" leading to the Lough Neath lowlands. Belfast and Larne, the port for Stranraer, stand at the eastern gate; Coleraine and Portrush (near the famous Giant's Causeway) are at the northern gate; Monaghan and Armagh control the south-western gate; and Newry and Greenore, the packet station for Holyhead, command the south-eastern gate. Round the Lough itself are several small but important local market centres.

Londonderry and Moville, the latter a port of call for steamers sailing between America and Glasgow, command the Foyle route to and from the central plains. Ballyshannon stands at the sea end of the routes following the Erne; whilst Enniskillen, situated between upper and lower Loughs Erne, commands an important crossing point. Belfast is connected to the upper Shannon by canal and river routes, via the Lagan, Lough Neagh, the Blackwater, the Ulster Canal, upper Lough Erne and the Shannon Canal. The Newry Canal gives through water communication between Lough Neagh and Carlingford Lough.

SOUTHERN IRELAND.

Physical Features.—In the south-west the east and west direction of the Old Red Sandstone mountain ridges resembles South Wales. At the northern base of the highest ridge, the MacGillycuddy's Reeks, lie the beautiful Lakes of Killarney, overlooked by Carrantual, 3,414 feet, the highest peak in Ireland. Along the south-west coast, the valleys between the parallel ridges have been drowned, forming a magnificent series of inlets, of which the chief are Dingle Bay, Kenmare River and Bantry Bay. Inlets like these are called *rias*, those which have been deeply glaciated prior to subsidence are known as *fjords*. These drowned valleys form magnificent harbours, but, except for naval purposes, are of comparatively little value, owing to the lack of a productive and populous hinterland. Bere

Haven, in Dingle Bay, is an important naval base. Two small islands off the coast of south-west Ireland are of considerable importance. *Valentia Island*, at the entrance to Dingle Bay, is the terminus of the earliest and of several subsequent telegraph cables to North America. It is also the most westerly of the British Meteorological stations, and therefore has a special importance in the making of British Weather Reports, because it is the first to announce the approach of storms, which largely come from the west. *Clear Island* has an important lighthouse and signalling station engaged in reporting the movements of Atlantic vessels.

In South-eastern Ireland the mountains have the same N.E.-S.W. direction as in the west and north-west, but the general direction of the rivers is from north to south (*e.g.* Nore, Barrow and Slaney). The rocks resemble those of the other "corner blocks" of the Irish Sea, the Mourne Mountains, the Southern Uplands and the Welsh Mountains. They are largely ancient sedimentary rocks with great masses of granite in the central areas. The Wicklow Mountains in particular are largely composed of granite, which rises into dome-shaped summits. Their valley forests and extensive areas of bog give them many points of resemblance to Dartmoor in South-western England.

Chief Occupations.—In the south-west the range of temperature is very small and the winters as mild as those of the Mediterranean lands. The rainfall is abundant, so that the grass grows all the year round. Therefore pastoral occupations, particularly dairy-farming and pig-rearing, are more important than agriculture, and are carried on in all the richer lands of the river valleys. In the highlands there are very few people, for life there is very hard owing to the thinness and poorness of the soil and the more severe weather conditions. Some fishing is engaged in, particularly for mackerel.

In the south-east the drier climate and the greater extent of lowlands make it possible for more agriculture to be carried on than in the south-west, but dairy-farm-

ing is still the most important occupation. Barley is extensively grown, and has led to the development of brewing industries at Waterford and Kilkenny. The upper valley of the Suir forms part of the Golden Vale, where mixed Old Red Sandstone and Limestone soils are exceedingly fertile. This is the only part of Ireland where wheat-growing is important. Some coal is mined near to Kilkenny, and also in northern Kerry, but the output is small and the coal is not of good quality.

Routes and Towns.—The chief routes are closely related to relief and generally follow the river valleys. In the south-west the roads and railways take the east and west direction of the valleys, *e.g.* the railway line from Waterford to Kilkenny. Kinsale on the Bandon, Cork on the Lee, and Youghal on the Blackwater, are the outlets for the dairy produce of their respective river valleys. *Cork* is the largest and most important town in Southern Ireland. Pigs are slaughtered, and cured for bacon, milk is condensed, and live cattle and enormous quantities of butter, cheese and eggs are exported to Great Britain, especially to Bristol. *Queenstown*, on an island in Cork Harbour, is a port of call for American mail and passenger steamers, although some of the largest liners do not now call there on the homeward-bound journey. Queenstown is connected to Dublin by a very important mail line. The barrier of the east and west mountain range, which bars the way to the north, is surmounted by a gap at whose northern end stands Mallow on the Blackwater (see Fig. 31). The line then sweeps round the northern margins of the Galtee Mountains and proceeds across the central plain to Dublin and Kingstown.

The outlets for the rich vales of Suir, Barrow and Slaney are *Waterford* and *Wexford*. Both have been superseded as passenger ports by *Rosslare* in south-east Wexford, an important mail and passenger port with fast steamship connections with Fishguard in Pembroke. The chief inland agricultural centres are *Tipperary*, *Cashel* and *Clonmel* (all three in the Golden Vale), *Kilkenny* (on the Nore), and *Carlow* (on the

Barrow). From the earliest times the fertile valleys of S.E. Ireland have been of greatest importance. Cashel was the capital of the old kings of Munster, whilst the valleys of the Nore, Barrow and Slaney formed the richest parts of the powerful kingdom of Leinster. The large number of ruined castles, abbeys and monasteries also bears testimony to their agricultural wealth.

The upper Barrow is connected by canal to the Grand Canal, and therefore with Dublin, which is the natural outlet for the products of that part of the basin.

WALES.

PHYSICAL FEATURES.

Wales consists of a solid core of Highlands extending from north to south and bordered on three sides by narrow coastal plains. In the north the coastal plain broadens into the low island of Anglesey, in the west the mountains come close to the coast, and the Plain of Cardigan is very narrow, whilst in the south the plain is wide in Pembroke in the west and in the Plain of Gwent east of Swansea, but narrower in the centre. Structurally, the greater part of Wales may be compared with the Southern Uplands of Scotland, for both areas are dissected plateaus composed of ancient, hard rocks, but the scenery is more reminiscent of that of the Scottish Highlands. The N.E.-S.W. trend of the more important features, which we found so prominently emphasized in Ireland and Scotland, is very evident in Wales. In the south, however, the direction of the "graining" is clearly east and west, as is demonstrated by the Pembroke and Gower peninsulas, the Brecon Beacons and the Plain of Gwent. This part of Wales may be thus compared with south-west Ireland. The Brecon Beacons are of Old Red Sandstone, a formation which extends eastwards through Monmouth and Hereford. South of

the Brecon Beacons, and including the Pembroke and Gower peninsulas, the rocks are the coal measures (see Fig. 32).



FIG. 32.—Wales. Relief, Routes and Coalfields.

The Welsh highlands have been deeply trenched by river valleys, which have broken them up into a number of separate masses. Thus, the Snowdon Range, with

Snowdon (3,560 feet), the highest peak in England and Wales, lies between Menai Strait and the Conway, and the Berwyn Range between the Dee and the Severn. The watershed lies at no great distance from the west coast, so that the greater slope is towards England, *e.g.* the Dee, Severn and Severn tributaries.

When Angles, Jutes and Saxons poured into Britain, Wales became a sanctuary in which many of the earlier inhabitants of the invaded territory found refuge. The mountainous nature of the country and its difficulty of access helped this. But, as a glance at the physical map will make clear, there is no central point upon which the mountain valleys converge. Separated from each other by high mountain barriers, they open, either to the sea on the west, or to the English plain on the east, so that the unity of the whole under one strong central government was never possible. Moreover, the comparative ease with which conquerors could penetrate along the narrow plains bordering the north and south coasts, and along the valleys of the rivers flowing eastwards to the English plain, facilitated the English conquest of Wales. Nevertheless in such a land the physical features have helped many of its inhabitants to retain their ancient language, manners and customs, and thus Wales may well be described as a "Treasure House of the Past," or a "Home of Lost Causes." To-day, by no means the least contribution of Wales to the life of Britain is the export of considerable numbers of its inhabitants, who find wider opportunities of advancement in its more richly endowed sister country.

CHIEF OCCUPATIONS.

The large proportion of the country which is mountainous, the poor soil and the severe climate of the mountainous regions, and the heavy rainfall, all limit agriculture to the coastal plains, Anglesey, and the river valleys. Very little wheat is grown, but oats, barley and root-crops are cultivated. Pastoral occupations are very important, particularly the rearing of

cattle and sheep. Cattle-rearing and dairy-farming are chiefly confined to the plains, and particularly to the counties of Anglesey, Pembroke, Carmarthen and Flint, all of which lie within easy reach of markets for their products, whilst very large numbers of sheep are pastured in all the hilly parts of the country (see p. 64 and Fig. 24). The sheep are reared both for their flesh and for wool, the plentiful supply of the latter accounting for the manufacture of flannel and other woollen goods in many of the valley towns, particularly at *Newtown* in the upper valley of the Severn.

The mineral wealth is of considerable importance, especially the rich deposits of coal. The *South Wales Coalfield* has an area of 1,000 square miles, not including its westward extension in Pembroke. The main coal-field lies between the Usk on the east and the Towy on the west, and is divided into three parts by the Taff and the Tawe. Many varieties of coal are mined, including the bituminous coal of the east, the steam coal of the centre and the anthracite of the west. About two-thirds of the coal mined is exported to foreign countries from *Swansea*, *Cardiff*, *Newport*, etc. These towns are situated at the mouths of rivers which have cut their way across the parallel east and west ridges in which the coal is found. Thus the rivers have not only facilitated the exportation of the coal, but, by exposing the coal measures, they have rendered mining operations easier. Great metal industries are carried on in this part of Wales, most of the ores being imported from abroad, particularly from Spain. Iron is smelted at *Cardiff*, *Swansea*, *Newport*, *Merthyr Tydvil* and other towns; copper, lead and zinc, in and around *Swansea*; tin-plate (made by coating iron plate with tin) is made at *Swansea* and *Llanelly*. Formerly, copper and tin ores were imported from Cornwall, hence the towns engaged in smelting them are located on the coast, but very little Cornish ore is now used. Those interior towns engaged in smelting imported iron ore (e. g. *Merthyr Tydvil* and *Dowlais*) originally only smelted local iron ore. *Cardiff*, the great port of the region, exports, in normal times,

more coal than any other British port. The South Wales smokeless steam coal is in great demand for steamships and warships. *Pembroke*, on the splendid natural harbour of Milford Haven, is a naval dockyard.

The *Flint and Denbigh Coalfield* in the north-east has only a small output and supports no very large industrial towns. *Wrexham* and *Ruabon* are the chief centres.

Building stones and slates are quarried in many parts of the country. The chief slate quarries are in Carnarvonshire, where the slates from the famous Bethesda and Llanberis quarries are exported from *Bangor* and *Carnarvon* on Menai Strait.

The magnificent scenery of the Welsh Mountains, and the grandeur of the coast, bring thousands of holiday-makers to the country, and the catering for their needs finds employment for large numbers of people. The watering-places of the north coast and of Anglesey (*Rhyl*, *Colwyn Bay*, *Llandudno*, *Bangor*, *Beaumaris*, etc.) are within easy reach of the vast populations of the Lancashire and Midland industrial regions, whilst those of the west coast (*Aberystwyth*, *Barmouth*, etc.) are most accessible to the Midlands. There are also many interior tourist centres, particularly in the Snowdon district.

The heavy rainfall of the Welsh Mountains has a special value for certain large centres of population outside Wales. The upper valleys of the Vyrnwy (North Montgomery) and a tributary of the Wye (West Radnor) have been barraged in order to create great reservoirs for the supply of water to Liverpool and Birmingham respectively. Manchester obtains most of its water from Thirlmere in the Cumbrian Lake District. This important economic value of many wet mountainous regions should be carefully noted. It is not improbable that even London may ultimately have to meet its needs by bringing water from Wales.

ROUTES AND CHIEF CITIES.

Wales is easy of access along the north and south coastal plains. These two routes have been of great importance for centuries, a fact which is emphasized by

the number of castles found on both. The north coast route, used by Edward I for his conquest of Llewellyn, who made his stand in the Snówdon group, is commanded by Chester. It is followed by the London and North-Western passenger and mail route to Holyhead, from which Kingstown, the port of Dublin, lies almost due west about 60 miles away.

The south coast route was controlled by Cardiff Castle, but Gloucester was also a very important control point because it stood at the lowest bridging point of the Severn. In connection with the ease with which people and trade have passed along this great highway of South Wales, it is worthy of notice that the lowland county of Pembroke has been called "Little England beyond Wales," owing to its non-Welsh people and language. The Great Western Railway utilizes this route for its mail and passenger service to southern Ireland via Fishguard. Now that many of the homeward-bound American liners call at Fishguard, passengers and mails, by using this route, can arrive in London before the liners reach Liverpool.

Other routes which enter Wales from England utilize the valleys of the Dee, Severn and Wye. It was to overawe Wales and to control these routes that the three earldoms of the Welsh Marches—Chester, Shrewsbury, Hereford—were created, for, owing to the relative poverty of the highlands of Wales and the richness of the adjoining English lowlands, the Welsh often indulged in raids: hence "Taffy was a Welshman and Taffy was a thief." Chester commands the route which passes through Wrexham and Ruabon, and then follows the upper Dee and Lake Bala to the Mawddach, past Dolgelly to Barmouth. This route is connected with the north coast route by railways following the Conway and the Clwyd valleys.

Shrewsbury commands the line following the upper Severn, and passing through Welshpool and Montgomery. The line leaves the main valley and follows that of a tributary, which leads it over a low watershed (below 700 feet) to the valley of the Dovey, where the

line forks, one branch proceeding via Aberdovey and the coast to the lower valley of the Mawddach, the other to Aberystwyth. Carmarthen and Swansea are also connected with Shrewsbury, by a line which follows the north-east to south-west trend of the mountain chains, and thus uses tributary valleys of the Wye and the main valley of the Towy. Cardiff can be reached from Shrewsbury by a line following the plains along the eastern margins of the high ground and passing through Hereford and Newport. The position of Shrewsbury in relation to the main routes of Wales is very interesting, for although it is an English city it is in many ways most suited for being the capital city of Wales, owing to the ease with which it can communicate by rail with North, Central, or South Wales. It is because of this that the colleges of the University of Wales (Cardiff, Aberystwyth and Bangor) hold their meetings there.

THE WELSH BORDER AND THE SEVERN BASIN.

THE CHESHIRE PLAIN.

This plain is drained by the lower Dee and the Weaver, a tributary of the Mersey, and is divided into two portions by a low ridge (over 300 feet in height) which forms the watershed between the two rivers. The plain is composed of New Red Sandstone, largely covered by a fertile drift, and alluvium; and as it lies to the leese of the highlands of North Wales it has a moderate rainfall, but sufficient for both *pastoral* and *agricultural* industries. The agriculture generally takes the form of market gardening, due to the proximity of the large population of south-east Lancashire, but the dairy produce, particularly cheese, is equally important.

Salt is obtained at Middlewich and Northwich. In some places the rock salt is quarried, but the usual method is to pump water into the mines and then to draw off the brine and obtain the salt by evaporation.

This process leads to frequent collapsings and subsi-

dences, so that the Cheshire salt towns are noted for the unevenness and irregularity of the outlines of the houses. The salt deposits have led to the growth of chemical and glass industries both in Cheshire and adjoining Lancashire towns. The Lancashire coalfield extends into N.E. Cheshire, where *Stalybridge*, *Hyde* and *Stockport* are cotton manufacturing towns. *Macclesfield*, further south, manufactures silk goods.

The Cheshire Plain is of great importance owing to the routes which cross it. On the one hand, it gives the easiest approach from the lowlands of Eastern and Central England to the lowlands of Lancashire and to the west coast routes to Scotland, and on the other, to the plain of North Wales, and beyond to Ireland. The London and North-Western Railway route for the north passes along the Weaver valley through *Crewe*, and crosses the Mersey at Warrington. The mail and passenger route for Holyhead and Ireland branches off at Crewe and proceeds north-westwards to Chester. Thus Crewe has become a very important railway junction. Its rapid growth had also been affected by the location in the town of the London and North-Western Railway engineering works. *Chester*, a prosperous town in Roman days, nearly 2,000 years ago, is the key to the route to the narrow north coast plain of Wales and to Ireland, and to the route along the upper valley of the Dee. Formerly it was an important port for Ireland, but the Dee estuary has been so silted up that it is now inland and can only be reached by small boats. The town has many notable sights, among which its ancient city walls, castle, cathedral and old houses are the most famous, and indicate clearly the past importance of the city.

The continuous stretch of plains from the Midlands to the Irish Sea makes the construction of canals linking the Mersey with the Trent and the Midlands a matter of comparative ease. The Birmingham Canal connects Birmingham and the Black Country towns with the estuary of the Mersey, and the Trent and Mersey Canal gives the same connection with the Potteries (see

Fig. 35). Although these canals are only broad and deep enough for large barges they are of great value in the transportation of heavy and bulky articles, *e.g.* coal, iron ore, building stone and kaolin.

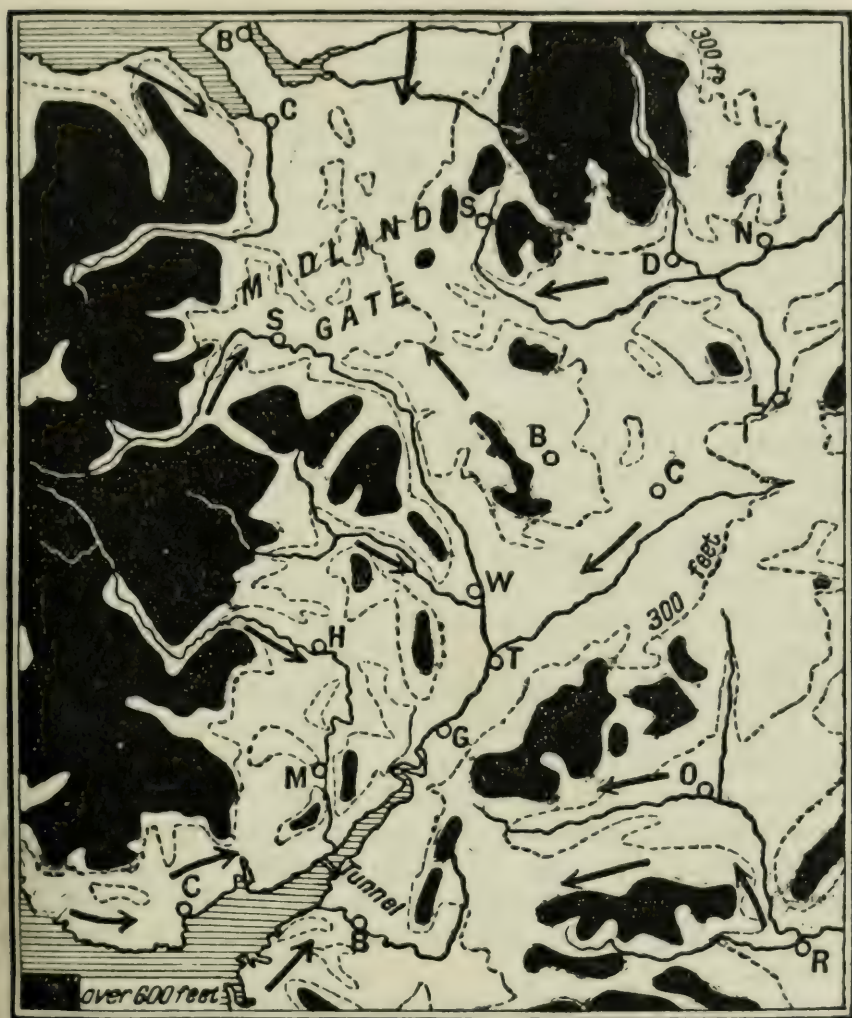
THE SEVERN BASIN.

The Severn rises in the Plynlimmon group, about twenty miles from Cardigan Bay, and after flowing north-eastwards enters the English lowlands above Shrewsbury. It then takes a great semi-circular course along the New Red Sandstone plains bordering the hill country, and finally reaches the sea in the great estuary of the Bristol Channel (see Fig. 33). Notice the north-east to south-west trend of the lower Severn and the Warwick Avon valleys (and also the lower Trent). These have been cut out in the soft measures along the base of the oolitic scarp (see Fig. 36). Formerly this plain stood much higher than it does to-day, and it is believed that the Severn above Tewkesbury was then the main headstream of the Thames, and that the lowering of valleys of the rivers flowing parallel to the Cotswolds brought about the separation of the upper Severn from the Thames and its capture and deflection to the Bristol Channel by the Warwick Avon and the lower Severn.

The upper basin of the Severn lies between the source and the gorge where the river passes between the Wrekin, an isolated volcanic mountain nearly 1,350 feet in elevation, and Wenlock Edge, an outlier of the South Shropshire Hills. It is very probable that the upper Severn emerged from the Welsh highlands to a plain which formerly stood at the level of the tops of the Wrekin and Wenlock Edge, and that the gorge already mentioned has been produced by the lowering of the plain to its present level.

Between the Cheshire Plain and the English Midlands the plain is narrowest where the Severn makes its great bend, *i.e.* where the South Shropshire Hills, outliers of the Welsh Mountains, come closest to the

Pennines. This comparatively narrow gap is known as the *Midland Gate* (see Fig. 33). *Shrewsbury*, the most important town on the upper Severn, had its origin in



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FIG. 33.—Sketch Map of the Welsh Borderlands and the Severn Basin.

an old British stronghold built on a sandstone rock around which the Severn makes a loop. It stands at the junction of Watling Street, the Roman road from London to Chester, and another Roman road traversing the hill country to Hereford in the south. Later roads

converged upon the city from the upper basin of the Thames, from Birmingham and from Crewe, whilst in modern times all these routes are followed by important railways.

The Severn valley does not open out into the broad plains of its middle course until it leaves Bewdley, north of the confluence of the Stour. In the narrow valley between the Plain of Shrewsbury and the middle basin (note how close the 300 feet contour approaches to both banks of the river) there are several small mining and industrial centres. *Coalbrookdale* has a small coal-field, now almost exhausted, and is famous for its china-ware. *Ironbridge* was the first place to make bridges of iron, and *Bridgnorth*, a very beautiful town partly built at the river level and partly upon a high sandstone cliff overlooking the river, has a small carpet industry. On the top of the cliff are the ruins of an old castle, which formerly dominated this gorge-like portion of the river.

The rich agricultural and pastoral plain of the middle and lower Severn is broadest where the valley of the Warwick Avon opens out to it on the east. Further south it narrows between the Cotswolds and the Forest of Dean. The Stour valley leads to the Black Country and contains *Kidderminster*, noted for carpets. The Warwick Avon drains a rich agricultural and pastoral region noted for its orchards, especially in the neighbourhood of *Evesham*, located on the river where it enters the plain of the main stream. In the upper valley, however, *Coventry* is famous for its motor cars and cycles, whilst *Rugby* has electrical engineering works.

Worcester, centrally placed in the Plain of Worcester, stands near the confluence of the Severn and the Teme, and commands the routes following the Teme, as well as those from the valley of the Warwick Avon. It has potteries and is particularly noted for finest porcelain. *Gloucester* grew up at the lowest bridging point of the Severn, and on account of this, and its excellent position for controlling the routes along the coastal plain of

South Wales, it very early became an important city. The approach to the city by river is very difficult owing to the bore formed by the tide (see p. 53). Therefore, in order to make it accessible for ships bringing timber, grain, etc., for the thickly peopled Black Country coal-field, a canal has been constructed between Sharpness and Gloucester. From Gloucester the goods are dispatched to their destination either by rail or by boats, the latter using the canalized Severn and the canals which connect it with Birmingham and other midland cities (see Fig. 35).

Of the left bank tributaries the Wye is the most important. It rises near to the source of the Severn, and, after leaving the Welsh highlands, winds across the fertile plain of Hereford, which is composed of Old Red Sandstone rocks formed in a basin lying between the Malvern Hills to the east and the Welsh highlands to the west (see Fig. 37). *The Plain of Hereford*, like other Old Red Sandstone plains (*cf.* Strathmore), is very fertile, and is noted for cattle-rearing, dairy-farming, fruit and hops. The Malvern Hills rise very abruptly from the plain on their eastern margins, and this is due to the presence of a great fracture which skirts the eastern base of the hills. *Hereford*, the chief town, stands on the Wye, and, like *Ludlow* on the Teme, is a typical border town with many historical associations. Both are on the main north and south roads and railways which follow the direction of the border from Shrewsbury to Newport, and also command the east and west routes following the rivers upon which they stand.

On leaving the Plain of Hereford the Wye flows through a gorge which it has cut in the carboniferous limestone plateau known as the Forest of Dean. *Monmouth* lies to the north of this gorge and *Chepstow* to the south. The Forest of Dean has a small coalfield. Iron has been smelted there from Roman times—formerly, of course, by the use of wood for fuel.

The Cotswolds are noted for their sheep-rearing, and this, together with an abundant water supply, led to the early development of woollen cloth manufactures at

Stroud, Frome and Bradford-on-Avon. One tributary of the Severn has cut its way right through the Cotswolds and now rises on the eastern side. Its valley was utilized for the construction of the Thames and Severn Canal which reaches the latter river below Gloucester.

The Bristol Avon is in many respects a most remarkable river. Its headstream flows eastwards along the gradual eastern slope of the Cotswolds. It then turns southwards following the direction of the Cotswolds, but flowing along the clay vale between those hills and the White Horse Hills. Later it turns westwards and enters the gorge which it has cut to the south of the Cotswolds. After passing Bristol it flows through another gorge cut in the small carboniferous limestone plateau (*cf.* the Wye gorge in the Forest of Dean) between Bristol and the sea. It would seem as though the river first cut its way backwards through the gorge south of the Cotswolds, that it then developed a lateral tributary along the soft clay, and that this captured and deflected to itself a former tributary of the Thames (*i.e.* the part of the river above Malmesbury). *Bath*, which controls the approach to Bristol from the Thames basin, is one of the oldest towns in Britain. It is a residential city, and still retains the warm springs which made it famous in Roman times.

Bristol owed its origin as a port to its trade with Ireland, but this was extended by the great discoveries of the fifteenth and sixteenth centuries to the West Indies and to North and South America. With these countries it still has a considerable trade, upon which its tobacco, cocoa and sugar manufacturing industries are based. In modern times, however, the increasing size of vessels has meant that Bristol has been handicapped in the competition with other western ports, particularly with Liverpool, not only for the American trade, but also for the trade of the industrial districts of the English Midlands. The port's disadvantages in this respect are due to the presence of the Clifton gorge between Bristol and the sea, and to the great tidal rise and fall of the

river Avon. It is, however, conveniently situated with regard to the supply of coal from the Bristol and Somerset coalfield. The disadvantages of the port are somewhat counterbalanced by the docks which have been constructed at *Avonmouth*, the modern harbour for large ocean-going vessels. The Avon is connected to the Thames by two canals, the Kennet and Avon and the Wilts and Berks. These pass south and north of the Marlborough Hills respectively.

THE MIDLANDS AND THE BASIN OF THE TRENT.

PHYSICAL FEATURES.

East, south and west of the Pennines the older measures of that mountain system dip under the newer formations and make a foundation upon which the latter rocks rest. The great Red Plain of the Midlands, and its northern extensions on both flanks of the Pennines, are chiefly built of new red sandstone and of red marl, a kind of clay. But as in East Anglia, there are many places covered with boulder clay and other glacial deposits, whilst along the courses of the main rivers alluvial deposits are frequently extensive. These newer rocks do not, however, form a continuous level surface, for in places the older rocks of the floor stand out above the general level (see Fig. 20), as in North Leicestershire, North Warwickshire and South Staffordshire; and since these older rocks are the coal measures we have thus several coal-mining areas. It is probable that coal extends beneath all the younger measures and may be mined where the depth is not too great.

The Trent rises on the south-west flanks of the Pennines, and after bending round their southern margins turns northwards to join the Yorkshire Ouse in their combined drowned estuary called the Humber (see Fig. 34). On the left bank it receives swift-flowing Pennine feeders, such as the Dove and the Derwent; whilst on its right

to that of the Trent. At Lincoln the Witham flows through a gap cut in the oolitic ridge, and then flows south-eastwards to the Wash. It is believed that this was once the lower course of the Trent.

OCCUPATIONS OF THE TRENT BASIN.

On the coalfields, the development of great industries has led to the growth of large centres of population. Elsewhere, pastoral and agricultural occupations are followed, for the soils of the Red Plain are very fertile. The *North Staffordshire Coalfield*, situated on the south-western flanks of the Pennines, is noted for mining and the manufacture of pottery ware, hence it is commonly called *The Potteries*. The pottery trade owed its origin to the presence of local deposits of clay suitable for manufacture, but only the coarser kinds of articles are now made of local clay. For the finest china and porcelain, Cornish and Devonshire potter's clay or kaolin is imported by sea to the Mersey and thence to the pottery works by canal. The industry is carried on in the neighbourhood of the "Five Towns," of which *Stoke, Burslem and Hanley* are the chief (see Fig. 34).

Stafford lies south of the Potteries, in the basin of a tributary of the Trent. The surrounding country has rich pastures, which support large numbers of cattle, and these gave to Stafford its leading industry—the manufacture of boots and shoes.

The South Staffordshire Coalfield.—This coalfield is situated on the watershed between the Trent and the Severn, and extends from a little south of Stafford in the north to a little north of Birmingham in the south. It has the advantage of possessing considerable quantities of iron ore. Unfortunately, however, the latter is neither found in sufficient quantities nor is of sufficient quality to meet the demand, and much foreign ore has to be imported, particularly ores of high grade. The distance of the coalfield from the sea makes this a serious drawback, for despite the construction of canals (see Fig. 35) to the Mersey, the Humber, the Thames and the Severn,

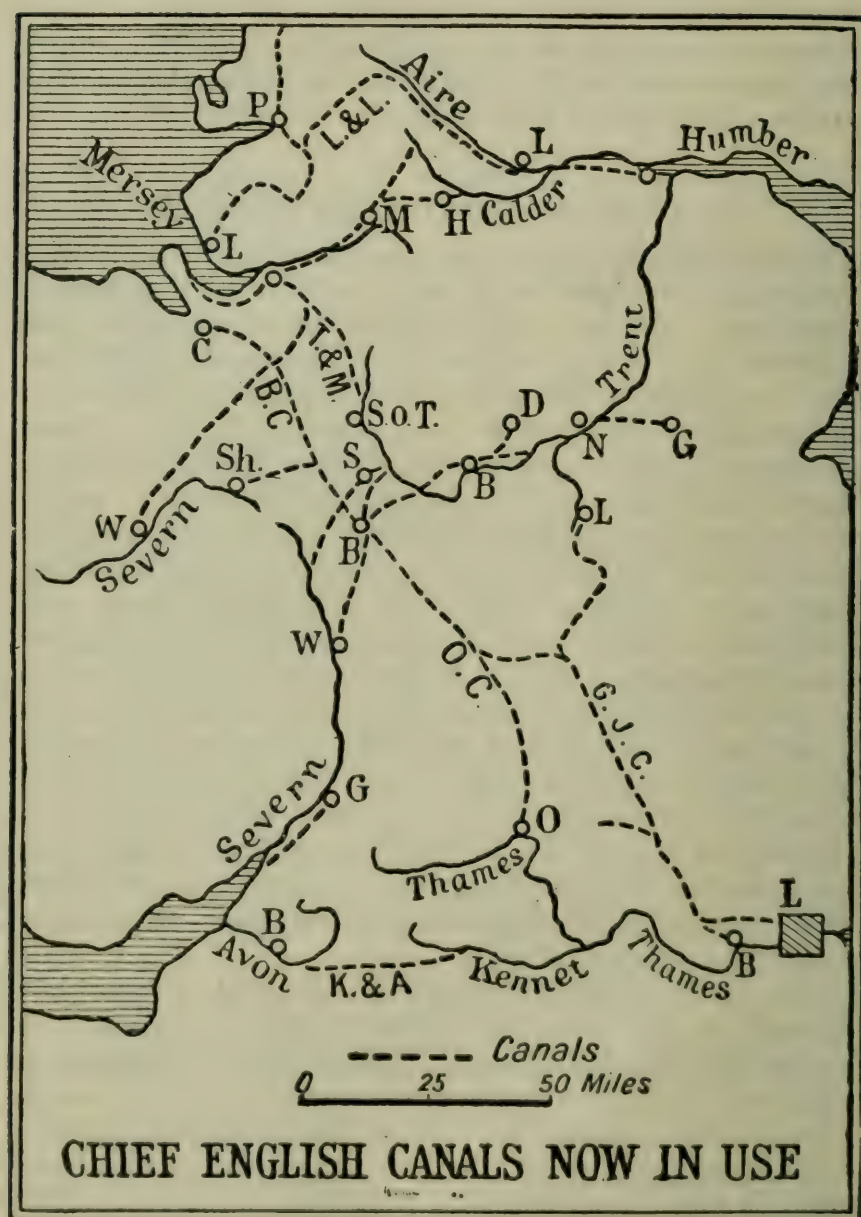


FIG. 35.

the competition of iron manufacturing regions situated on or near the coast (*e.g.* South Wales and Tyneside) is very severely felt. In former days the iron ore was smelted

with charcoal from the Forest of Arden and Cannock Chase—during the Civil Wars of the seventeenth century the district supplied the Parliamentary army with swords, etc.—and when, in later times, coal took the place of wood fuel, the industry naturally remained where it had sprung up. Before the coal-mining days, South Staffordshire was a picturesque, well-wooded, hilly country. To-day its forests have largely disappeared, and its surface is disfigured by pit-shafts, huge banks of refuse from pits and blast furnaces, inky canals, thousands of factories and by all that goes to make up a modern coal and iron mining and manufacturing region. It is on this account that this coalfield is known as the *Black Country*. All the towns are engaged in iron and hardware manufactures and produce a great variety of goods. Most of the articles manufactured are of little bulk as compared with their value, and this, of course, means that less iron ore has to be imported. Big, bulky iron and steel goods are more economically manufactured on the coalfields nearer the sea. The great centre of the Black Country is *Birmingham*, which is engaged in the manufacture of a variety of articles, but is particularly noted for fire-arms and ammunition, engines, motor cars and cycles, scientific instruments, etc. Although the city is not on the coalfield itself, its excellent canal and railway connections have made it the great trade centre of the whole district. *Wolverhampton* (locks and cycles), *Walsall* (saddlery and iron bedsteads), and *Dudley* (munitions and nails) are three of the chief towns actually located on the coalfield.

The Warwickshire Coalfield lies east of the Tame and extends to a few miles north of Coventry, which is in the basin of the Avon. *Coventry* has had a varied industrial history, and was formerly noted for its manufacture of silk. At the present time it is a very important centre for the manufacture of cycles and motor-cars, whilst during the Great War it was one of the chief centres for the manufacture of munitions.

The Leicestershire Coalfield lies in the north of that county and extends into South Derbyshire. *Ashby-*

de-la-Zouch is an important mining town, and *Burton-on-Trent*, owing to the suitability of its waters, a great brewing centre. *Leicester* lies some distance south-east of the coalfield, so that coal has to be brought to it by rail. It is engaged in the manufacture of woollen hosiery and boots and shoes, industries which suggest the keeping of both sheep and cattle. The former are reared on the hill country of the oolitic limestone scarplands which lie in the south of the county, the latter on the rich pasture lands of the Trent and Soar lowlands. Wool and hides are, however, not produced in sufficient quantities to supply the demand, and both have to be imported. The Stilton cheeses and pork-pies of Melton Mowbray further emphasize the importance of dairy-farming. Find on a physical map the high tract of land called *Charnwood Forest*, lying between Leicester and the coalfield. The rocks of this hilly district are slates and granites like those of Wales. On this account it has been described as a bit of Wales within the English lowlands, and also as a solitary place within a thickly peopled region, a wilderness in the midst of mines and manufactures.

The Derby and Nottingham Coalfield lies on the flanks of the south-eastern Pennines and is the southern part of the great coalfield which extends almost from the Wharfe to the Trent. *Derby* is the engineering centre of the Midland Railway Co. and has also silk and china industries. *Nottingham*, on the Trent, manufactures cotton hosiery and lace (see p. 75).

The lower course of the Trent lies across plains over which the river has spread deposits of alluvium. The dry climate makes it possible for wheat to be grown extensively, whilst enormous quantities of potatoes and root-crops are also produced. The chief centres are *Newark* and *Gainsborough*. The latter is situated near the tidal limit of the Trent and experiences the famous *eagre* (see p. 53). Between Gainsborough and the Humber the land adjoining the river is very low and marshy (*e.g.* Isle of Axholme), and resembles the Fens and the marshes of the Lincolnshire coast.

THE SCARPLANDS AND PLAINS OF SOUTH-EASTERN ENGLAND.

South and east of the line formed by the lower Severn, the Warwick Avon and the lower Trent, the New Red Sandstone measures of the Midland Plain dip beneath layers which form the long, curved but broken line of hills extending from Portland Island to the Yorkshire Moors. These hills are composed of Jurassic limestone, which is also called roestone or oolitic limestone, because it is composed of very small round or egg-shaped grains. Fig. 36 shows that this belt of limestone includes the Cotswolds, Edge Hills, Northampton Uplands and the Lincoln Edge, and that it is gradually diminishing in breadth, whilst between the Lincoln Edge and the Yorkshire Moors it disappears altogether. The oolitic measures dip eastward (see Fig. 37), first below vales of clay and other soft layers, and then below a great sheet of chalk, which in turn forms a broad basin, the London Basin, largely filled with clays and sands. It will be noticed that both the limestone and the chalk measures end in an abrupt steep face, or escarpment, and that the other slope, or dip slope, is much less steep. It is believed that these measures once extended much further west, and that they have been eaten back by weathering and by the action of streams. These forces have also been at work in lowering the level of the vales of softer layers which separate all the belts of more resistant rock.

In south-eastern England the North and South Downs were formerly united by a great arch of chalk which has been removed so that the older measures of the Weald are now exposed. In the central part of Southern England, south of Salisbury Plain, the chalk layers dip beneath younger, softer measures, chiefly clays and sands, comparable to those of the London Basin, and form what is known as the Hampshire Basin. The chalk reappears in the centre and south of the Isle of Wight. The chalk hills radiate from the upland of

THE BRITISH ISLES

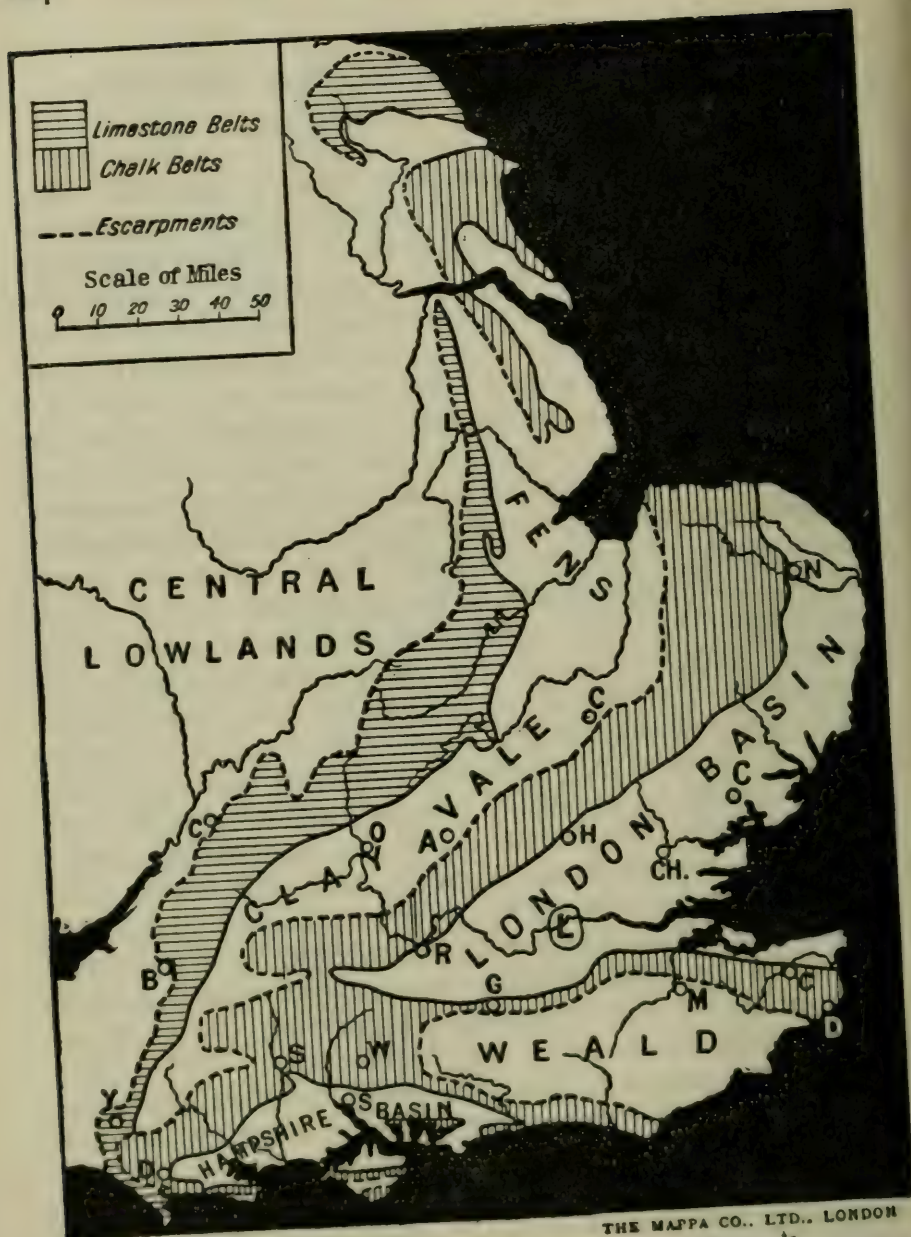
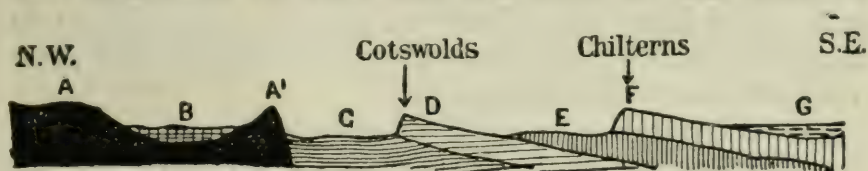


FIG. 36.—The Scarplands of South-Eastern England.

Salisbury Plain, and should be followed on Fig. 36 and also on a physical map of England. One long crescent-shaped line, roughly following the direction of

the oolitic ridges, with its escarpment looking towards the Midlands, includes the White Horse Hills, frequently called the Marlborough Downs, Chilterns, East Anglian Heights, Norfolk Edge, Lincoln Wolds, and the Yorkshire Wolds. This line has been breached in several places, but notably by the Wash and the Humber. East of Salisbury Plain the chalk is continued as the Hampshire Downs. These split into two lines of hills, the North and South Downs, which run roughly eastwards and terminate on their seaward ends in the cliffs of



- A Ancient rock of Radnor Forest*
- B Old Red Sandstone of Herefordshire*
- A' Ancient rock of Malvern Hills*
- C Soft Measures (New Red Sandstone & Clay) of Severn R. Plain*
- D Oolitic Limestone Scarp of Cotswolds*
- E Clay Vale of Oxfordshire*
- F Chalk Scarp of Chilterns*
- G Clays &c. of London Basin*

FIG. 37.—Diagrammatic Section from Radnor to London.

Dover and Beachy Head respectively. They are, however, continued across the narrow seas in France, their present separation being due to the formation of the Straits of Dover. The steep escarpments of the North and South Downs look inwards to the Weald. A fourth line, the Western Downs, or Dorset Heights, extends from Salisbury Plain in a south-western direction.

These scarplands and lowlands of south-eastern England are in a striking contrast to the rest of the British Isles. They include much less than half of the area of England and Wales, but over three-fifths of the arable land, and, of course, only the gentler slopes of the hills will be ploughed. Agriculture is everywhere the leading occupation of the plains and sheep-rearing

of the hills, for apart from London and a few ports—chiefly naval—there are no great industrial centres. But it must not be forgotten that it is this essentially agricultural part of England which has had most to do with the making of the country's history, for the large masses of people now concentrated upon the coalfields of northern England are features of comparatively recent growth. And, as in the great plain of northern France, so in the lowlands of south-eastern England, until the days of coal and iron there was only one really large town, Paris in France, and London in England, which dominated the whole region and grew rich and powerful thereby.

I.—THE BASIN OF THE WASH.

The Wash is a wide opening formed by the encroachments of the North Sea. These encroachments were brought about by the subsidence of the land and the breaching of the chalk scarplands at a point where they were very low. It occupies the lowest part of *The Fens*, tracts of low-lying, marshy, and formerly sea-covered lands. In past times the Fenland extended as far inland as Cambridge, Huntingdon, Peterborough and Lincoln; but much of it has been drained by the construction of drainage canals, such as the famous Bedford Levels, by the canalization of the rivers, and by the introduction of windmills and other agencies for pumping water from the land to the watercourses. The Wash itself is diminishing in size, partly owing to the deposition of the silt brought down by the rivers, and partly to the dumping of sand and other materials produced by coastal erosion and swept along by the tides. The English Fens bear a close resemblance to the low-lying lands of Holland (=hollow or low land) on the opposite side of the North Sea. Indeed, the southern part of Lincolnshire is called Holland.

The chief rivers flowing to the Wash are the Witham, Welland, Nen and the Great Ouse. All these rise in the oolitic escarpment, but the Witham rises on the

western slope and does not reach the clay vale between the limestone and the chalk ridges until it has passed through the gap it has cut in the Lincoln Edge at the city of Lincoln. Notice also the parallel courses of the Welland, Nen and Ouse, and how very low are the divides or watersheds between them. They are good examples of longitudinal rivers.

OCCUPATIONS OF THE BASIN OF THE WASH.

In this part of England the broad expanse of plains, and the semi-continental character of the climate make agriculture the leading occupation. Great quantities of cereals (particularly wheat), pulses, root-crops and fruit are grown. Pastoral occupations, too, are of considerable importance, and both cattle and sheep are reared, but not in really large numbers, except on the marginal limestone and chalk scarplands whose dry pastures support large numbers of sheep. The absence of coal militates against the growth of manufacturing, except of such articles as are required in the pursuit of agriculture, or of goods for whose manufacture the pastoral pursuits provide the raw material. Thus, agricultural implements are manufactured at Peterborough, Bedford and Lincoln, whilst boots and shoes are made at Northampton and Kettering.

On or near the coast there are small ports with fishing industries. Of these *King's Lynn*, near the mouth of the Great Ouse, and *Boston*, near the mouth of the Witham, are the chief. Both are considerably hampered by the difficulties of navigation amid the shoals of the Wash, and can only be reached by small vessels. *Grimsby*, on the Lincolnshire coast, near the mouth of the Humber, is not in the basin of the Wash, but this is the most convenient place to refer to it. It is an important port—the seventh in the United Kingdom in order of the value of its imports and exports—and carries on a large trade with the Baltic and North Sea ports, especially in the cotton and woollen manufactured goods of Lancashire and Yorkshire. It is also a great

trawl-fishing centre. In connection with its fishing industry special train services are organized to send the catch as quickly as possible to London and the industrial centres of Lancashire, Yorkshire and the Midlands.

Inningham, a few miles further up the Humber, is a new deep-sea port, whose growing trade resembles that of Grimsby and Hull.

CITIES AND ROUTES OF THE BASIN OF THE WASH.

Three leading types of town sites can be distinguished. Cambridge, Bury St. Edmunds, Bedford, Huntingdon and Peterborough are the chief of a number of towns standing on the raised, and therefore drier, ground surrounding the Fen depression. Within the Fens themselves are many towns which grew up on raised gravel "islands." Of these the chief are the cathedral city of Ely (the refuge of Hereward the Wake), March and Spalding. The third set of towns are along the coast.

Before the Fens were drained they formed a serious obstacle to communications. In Roman times the great road from London to Lincoln skirted their western margin and passed through Cambridge, Huntingdon and Peterborough. *Cambridge*, a famous University town, stands on the Cam, a tributary of the Ouse. *Peterborough*, a cathedral city, stands on the Nen. It manufactures agricultural instruments and bricks, and is an important market for wheat. It is on the main line of the Great Northern Railway. The cathedral city of *Lincoln* controls the roads and railways which converge upon the gap cut by the Witham in the Lincoln Edge. Its industries resemble those of Peterborough. The number of cathedrals and monasteries in this part of England bears witness to the agricultural wealth of the region. The University of Cambridge is also enriched by agricultural endowments. The main Midland Railway passes through *Bedford* and *Kettering*. The former stands near the navigation limit of the Ouse, and is a

market centre with engineering and straw-plaiting industries. *Kettering* has boot and shoe factories. *Northampton*, the chief British town engaged in this branch of the leather industry, stands near the navigation limit of the Nen and just off the main London and North-Western line from London to Crewe.

II.—EAST ANGLIA.

East Anglia lies east of the Fens and is a part of the London Basin. It is drained by the Bure, Yare, Waveney, Stour, Colne, Chelmer and Crouch, and contains the greater part of the counties of Norfolk, Suffolk and Essex. Much of the land has been covered by a thick sheet of boulder clay left behind by the melting of the ice sheets of the Great Ice Age. In places, particularly in the east of Norfolk and Suffolk, the surface is undulating, owing to the presence of morainic mounds and low hills, which were also left behind by the ice sheets. Formerly the clay areas were densely forested, especially in Essex, where remnants are still seen in Epping and Hainault Forests. In early times, East Anglia, with the Fens on the west, and the Lea valley swamps and the Essex forests in the south, was isolated from the rest of England, but easy of access from the sea. Thus, when the Angles and Saxons entered by the Yare, Stour, Colne and other river gateways, they found themselves in a region in which they could develop that distinctive individuality which in later centuries was destined to make their descendants the pioneers of many movements for civil and religious liberty.

Along parts of the coast of Norfolk the sea is busily engaged in the work of erosion, but in others the débris thus produced is being carried by tides and currents and dumped to form coastal gains. Thus waste materials from the soft cliffs of boulder clay and sand are swept southwards and have assisted in the silting of the mouths of the rivers, particularly of the Yare. It is very probable that this river had once a great estuary

extending to Norwich. This estuary has been partly filled by the silt of the Yare and its tributaries, and this, combined with the silting of the mouth, has caused the river to flow sluggishly through shallow lagoons, meres, or lake-like expansions known as *The Broads*. These are bordered, sometimes overgrown, with reeds and willows, and abound in water plants, fish and many kinds of water fowl, so that they are a paradise for those holiday-makers who prefer a peaceful holiday spent in boating, fishing, or shooting.

OCCUPATIONS AND CITIES OF EAST ANGLIA.

The climatic and soil conditions resemble those of the Basin of the Wash, so that there is a similarity of occupations. The boulder clay plains produce large crops of wheat, the sandier soils are noted for barley, whilst root-crops such as potatoes and turnips, and peas and beans, as well as strawberries and other small fruit, are widespread. In addition, the close contact with the North Sea and its rich fishing grounds has led to the development of great fishing centres, of which *Yarmouth* and *Lowestoft* are the chief. Both are noted for the enormous number of herrings landed there every year. The curing, smoking, packing and despatching of these finds employment for large numbers of people. *Yarmouth Harbour*, the safest open roadstead between the Thames and the Humber, is protected by huge sandbanks which lie about four miles off the coast. These have been built by the currents from the waste of the coasts. Between them and the coast are the protected waters known as *Yarmouth Roads*. Other coast towns of importance are *Cromer*, *Felixstowe*, and *Harwich*. *Harwich*, at the entrance to the Stour estuary, is a modern packet station with important continental connections, especially with Hook of Holland, Hamburg and Antwerp.

Norwich and Ipswich, the two largest towns of East Anglia, are both associated with river estuaries and a sea trade of past centuries. *Norwich* retains some of its old importance in the manufacture of wool and

III.—THE BASIN OF THE THAMES.

PHYSICAL FEATURES.

The Thames, the chief river in the British Isles, rises in the Cotswolds, and flows eastwards to its great estuary. The basin may be divided into two portions: the first, or upper part, from the source to the narrow gap where the river passes between the Chiltern Hills and the Marlborough Downs; and the second, or lower part, between that gap and the sea (see Fig. 39). The first forms part of the trough lying between the oolitic and chalk scarplands, and resembles the drier south-western portion of the basin of the Wash, of which it is a southern extension. The second, with East Anglia, forms the London Basin. The clay vales of the upper basin must have formerly stood at the same level as the top of the chalk. When, however, the upper basin was lowered the river began to cut, and later to deepen, a narrow gap through the chalk belt separating the two parts of the basin. This gap is known as the Thames or Goring Gap. In a similar manner the Wey, Mole, and Medway have cut gaps in the North Downs, so that the Thames draws some water from the Weald. *Oxford*, the famous University city, stands at the confluence of the Cherwell and the Thames. Below Oxford the Thames receives the waters of the Thame, which flows parallel to the escarpment of the Chiltern Hills, and in the opposite direction to the rivers flowing to the Wash. Its direction may be compared with that of the Warwick Avon. After having passed through the Goring Gap the main stream enters upon its lower course, which lies across the London Basin.

Measures of three main kinds fill the trough formed in the great sheet of chalk which underlies the London Basin. Immediately above the chalk are pebbly beds of sands, which appear at the surface along the fringes of the London Basin, and are known as the Reading

and Woolwich Sands. On the top of this lies the great cap of London clay, whilst in several places where the clay stands relatively high it is capped by sands (Bagshot Sands) younger than the clay. The most extensive area of Bagshot Sands lies in the western part of the London Basin south of the Thames. From Aldershot it extends almost to Windsor. In other places it is found in small patches, *e.g.* Hampstead Heath.

A political map will show that the Thames forms a county boundary throughout the greater part of its



FIG. 39.—The Basin of the Thames.

course, probably due to the fact that very early it became a boundary between those invaders who approached the river from the north-east, and those who landed on the south coast and then gradually pressed inland. That they did not take the natural line of entry, *i.e.* the river, was due to the strong fortress of London which barred the way.

OCCUPATIONS OF THE THAMES BASIN.

Naturally, the characteristics of the different kinds of soils are utilized by man and help to fix the leading occupations. The limestone and chalk ridges support

large flocks of sheep. Therefore we find many small manufacturing centres, e.g. *Witney*, west of Oxford, which has a blanket industry. In the Chilterns the presence of considerable beds of clay and sand lying on the chalk has given rise to the growth of small woods, in which the beech is largely found. This encouraged the establishment and growth of chair-making at *High Wycombe*. The sandy districts are not as a rule fertile, and where not pine-forested, are usually heathlands, e.g. Blackheath, Aldershot (hence its availability for a military training camp), Hampstead and Bagshot Heaths. In the river valleys, where there are frequently plains built up of alluvium deposited by the rivers during floods, and in the wetter parts of the clay lands, we find rich pastoral meadows, where dairy-farming is carried on, e.g. at *Aylesbury*, in the upper basin, and in the Kennet valley, where *Devizes* is a centre for Wiltshire bacon. The drier clay lands are ploughed and are devoted to the production of wheat, oats and barley, as well as to enormous quantities of green vegetables and root-crops which find a ready sale in the London markets. Associated with the agricultural industries are the brewing and biscuit trades of *Reading* and the straw-hat making of *Luton*. Most of the straw for the latter industry is now imported already plaited from Italy and elsewhere.

LONDON.

We have already noticed that the mouth of the Thames lies opposite to the mouths of the Rhine, the greatest continental river, and that the high tides of the river very considerably help its navigation. They also compel the provision of great docks. London itself grew up at the first point from the mouth at which a bridge could be placed across the river, for below that point, *i.e.* at London Bridge, the river was margined by broad flats over which the waters spread at high tide, whilst at that point the banks were high and dry, and firm enough for bridging purposes. Besides this, this

point was the limit of ocean-going navigation, for at Westminster, a little further up the river, there was a ford. Thus grew up the first crossing-place, and before long, roads radiated from it to all points of the compass, and finally around the meeting-place grew, not only the political and trading centre of the country, but the greatest city in the whole world.

London's position in south-east England at no great distance from the Continent, makes its approaches of great military and naval importance. Chatham at the mouth of the Medway, Sheerness on Sheppey Island, and Portsmouth on the south coast, are so placed as to protect the capital from attacks from east and south. The packet stations of Newhaven, Folkestone, Dover, Queenborough and Harwich are largely of importance because they lie on the routes between London and different parts of the Continent. Even Southampton is to a very considerable degree really an out-port of London, whilst watering-places like Brighton, Hastings, Deal, Margate, Southend, etc., derive the greater number of their patrons from the metropolitan area.

The Port of London receives about one-third of the total imports of Britain and sends out about a quarter of the exports. The imports include wheat and meat from the United States and Argentina; tea from China, India and Ceylon; dairy produce from Sweden, Denmark and Holland; mutton and wool from Australia and New Zealand; timber from the Baltic countries; silk from China and Japan; ivory and rubber from the Congo, etc. The exports are largely machinery, hardware and textiles. London has many industries, particularly leather, clothing, soap and candles, furniture, etc.; but her great importance is as a world market for food products, and as a vast collecting and distributing centre, not as a manufacturing city, for she is far from coalfields, a fact which has crippled the shipbuilding industry and only by Government aid makes the manufacture of armaments possible at Woolwich.

ROUTES OF THE THAMES BASIN.

London is the great dominating factor. Railway lines radiate from it like the spokes of a wheel (Fig. 40), and all, except those striking north-east along the East Anglian coast, or south-east along the plain between the North Downs and the river, have to cross the chalk scarplands at no great distance from London. Of these the Chilterns barrier is the most important, because it has to be negotiated by most railways. Fortunately both here and in the North Downs there are many

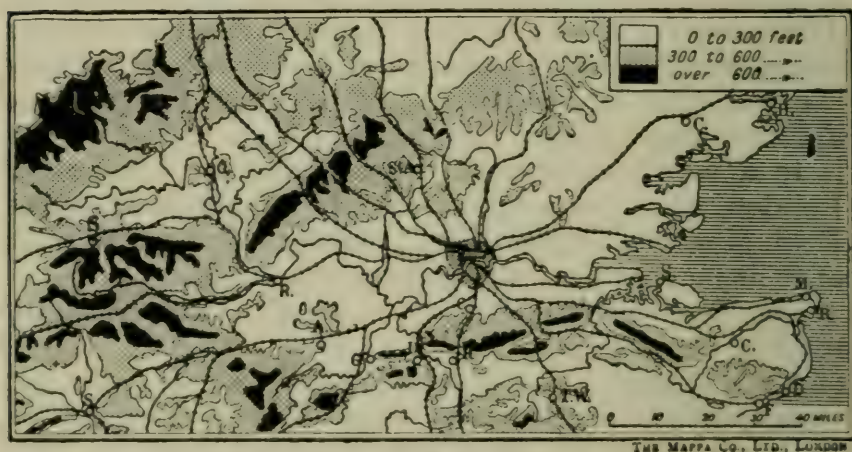


FIG. 40.—The Railway Lines which converge upon London.

river or water gaps (*e.g.* the Thames Gap followed by the Great Western Railway, the Lea Gap followed by the Midland Railway, the Dorking Gap used by the Brighton Railway), as well as wind gaps, so called because they no longer contain rivers (*e.g.* the Chiltern gaps controlled by High Wycombe, Berkhamstead, etc.).

The Great Western main line follows the Thames, and passes north of *Windsor*, which has grown round a royal castle built majestically upon a great rock of chalk lifted high above the river. At *Reading* the line forks, one route proceeding along the Kennet valley via

Newbury, either to Devizes, Bath and Bristol, or to Taunton and south-western England; the other via the Thames Gap, either to Oxford, Banbury, Leamington and Birmingham, or, passing along the northern margins of the Marlborough Downs, to Swindon, where the Great Western Railway engineering works are located. Proceeding westwards the latter line forks before reaching Bristol, one line entering that city, the other proceeding to the South Wales coastal plain and Fishguard via the Severn Tunnel.

IV.—THE WEALD.

Long ago a great sheet of chalk, several hundreds of feet thick, covered S.E. England and extended further west than the present Marlborough Downs—Chilterns—East Anglian Heights escarpment. It also spread out over the adjoining parts of the Continent. This vast chalk sheet was thrown into great up-and-down folds, of which the present Weald was the arch of an anticline or upfold, and the great dips of the strata below the Channel to the south and the London Basin to the north, complementary synclines or downfolds.

Now it is clear that the original rivers would run from the axis or crest of the arch either to the Thames or to the English Channel, and that besides cutting valleys they would gradually lower that part of the arch most subjected to denudation, *i.e.* the top. Eventually the chalk at the crest of the arch would disappear, and as this process continued, the tops of the arches formed by the measures underlying the chalk would in turn suffer denudation, until finally the Hastings sandstone layers would be disclosed. These measures form the Central Weald Heights (see Fig. 41). Crowborough Beacon, a hill near Tunbridge Wells, is located in the Central Weald Heights. It reaches about 850 feet above sea-level. Formerly the top of the chalk arch stood 3,000 feet higher!

The various measures represented in the Weald were not all weathered at the same rate. The clays, being

softer than the chalk, greensand, or Hastings beds, were lowered much more rapidly. Therefore the north and south flowing rivers were compelled to cut gaps in the harder measures in order to maintain their courses, whilst new east and west flowing rivers developed and

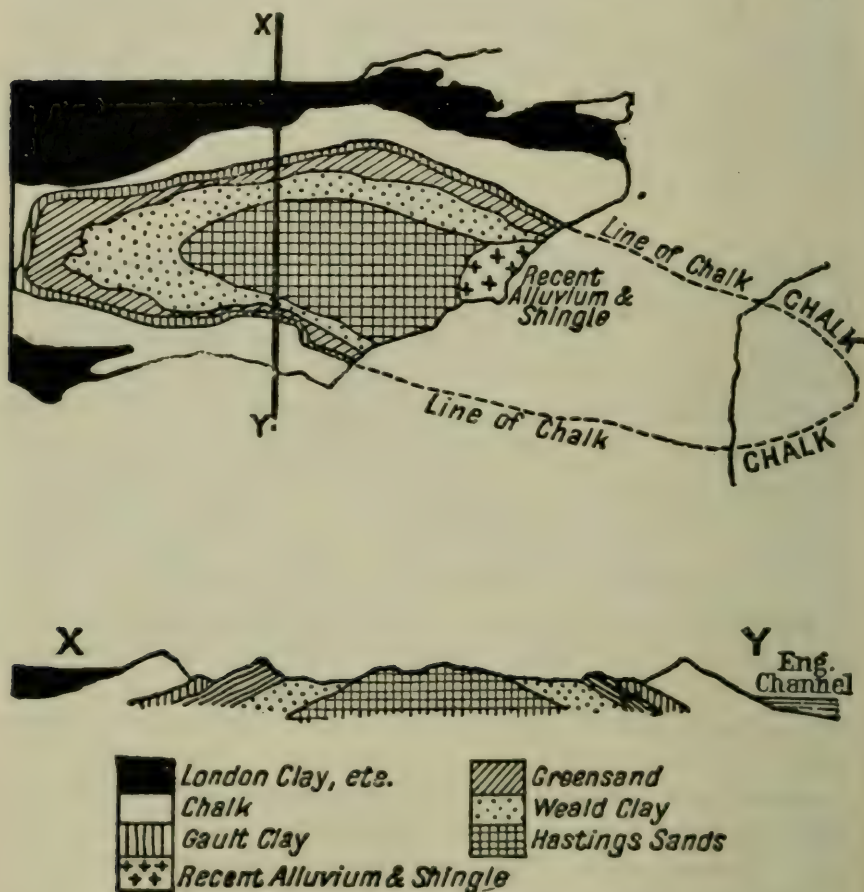


FIG. 41.—Structural Map and Section of the Weald.

flowed along the clay vales. These latter rivers did not form independent courses, but became tributaries of the original north and south streams. An examination of the map will show that most of the wealden rivers have both old (N. and S.) and new (E. and W.) portions, and also that they leave the Weald by gaps which they have

cut in the marginal chalk scarplands. In the course of time, the whole region—hard and soft measures alike—will be lowered and the scarps cut back to the level of the downfold of the London Basin, unless in the meantime earth movements interfere with the process.

Fig. 41 gives the wealden measures as they appear on the surface. It shows that the Weald is a horseshoe-shaped region—a part of an oval which is completed in France—with a belt of chalk on its outer margins, whose steep escarpments look inwards. Inside the chalk, but much more prominent in the north than in the south, is a belt of sandstone with similar escarpments. This in turn gives way to the plain of “bottomless” Weald clay, whilst the central axis of the Weald is formed by Hastings sandstone. Notice the extensive alluvial and shingle deposits near the mouth of the Rother. The alluvium has been brought down by that river, whilst the heaps of shingle ending in Dungeness have been piled up by the action of the strong tidal currents sweeping up-channel.

OCCUPATIONS OF THE WEALD.

The leading occupations show close connection with the relief and structure. The pastures of the North and South Downs support enormous numbers of sheep, especially those of the South Downs, for considerable areas of the North Downs are covered with clay, so that in their case it is possible to engage in agriculture and dairy-farming, industries of particular importance in view of the proximity to the great population of London. Villages on the Downs themselves are not as a rule very numerous, especially as the difficulty of obtaining water can only be got over by the sinking of very deep wells; but along the foot of the escarpments where the chalk rests upon clay, the water which has percolated through the porous chalk gushes out in springs, and there we find a line of villages. In the great horseshoe of Weald clay which surrounds the Hastings sandstone, and in the narrow clay lands

between the foot of the chalk escarpments and the greensand, agriculture is the dominating occupation, and fruit, hops, wheat, root-crops and dairy produce are produced. The sandstone areas—both greensand and Hastings sands—have still many forests, remnants of the vast forests which once covered the whole area, and which were largely cut down to feed the furnaces engaged in the smelting of wealden iron-ore found in the sandstone. Little or no iron is now smelted in this region, but before the days of coal the Weald was one of the chief iron-smelting regions in the country, and it is very probable that most of the old ironwork found in London and south-eastern England was made there. The low-lying fields of Romney Marsh, near the mouth of the Rother, are pastured by cattle.

TOWN SITES AND COMMUNICATIONS.

We have already seen that one common site for a village or township is where the springs gush out at the foot of the chalk escarpments. Other villages with similar advantages are where the sandstone rests upon clay. Another obvious site is either in or close to a wind or water gap in the chalk hills. Thus we have, in the North Downs, Guildford (Wey), Dorking (Mole), Redhill (wind), Rochester and Maidstone (Medway), and Canterbury and Ashford (Stour): see Fig. 42. In the two last-mentioned examples, the first town lies north of the gap, the second to the south. In the South Downs, Winchester (Itchen), Chichester (wind), Arundel (Arun), Brighton (wind), and Lewes (Ouse) are the chief gap towns. In every one of these examples, except in the case of the Arun, the gaps are followed both by road and rail, although in a few cases it was necessary to construct tunnels. Pevensey, Rye and Winchelsea are built on sandstone "islands" rising above flat lands. Formerly they were ports, but the silting up of river mouths has made them inland towns.

Along the coast there are many watering-places which are largely dependent upon London for support.

Brighton, the largest holiday resort in Britain, Eastbourne, Hastings, Folkestone, Ramsgate and Margate are the chief. *Dover*, the nearest English town to France, is only 21 miles from Calais, but the sea-passage between the two is not always of the happiest, owing to the strong tidal currents. Besides being a packet station for Calais and Ostend, Dover is also a great naval base; and, if in the future the Kent coalfields should prove to be rich, there is no reason why it should not become a great commercial port. The boring of



FIG. 42.—S.E. England. Relief and Routes.

the long overdue Channel Tunnel will certainly increase its importance. *Folkestone* and *Newhaven* are also packet stations, with connections with Boulogne and Dieppe respectively.

It is obvious that the main lines of communication will run either east and west, following the direction of the escarpments, or north and south, striking through the gaps. Thus the South-Eastern Railway from Reading to Dover enters the Weald at Guildford, and after traversing the plain at the foot of the chalk escarpment as far as Reigate, it follows the Weald clay to its destination, passing through Tonbridge, an important junction for the Hastings line. Similarly,

the London, Brighton and South Coast line from Hastings to Portsmouth runs from east to west, at first along the clay vale, but after Brighton along the gentle dip-slope of the chalk.

Contrasted with these lines, those giving connections between London and the south and south-east coast run north and south utilizing the gaps. Thus, the London and South-Western route uses the gaps at Guildford and Petersfield, and the Brighton line, either the Dorking Gap, or the more direct route via the Merstham Tunnel, which lessens the gradients on the route via the wind gap near Redhill. The latter line reaches its destination via the wind gap in the South Downs behind Brighton. The packet station of Newhaven is reached by the Ouse Gap commanded by the ancient town of Lewes. The South-Eastern lines to Hastings and Folkestone make use of the Sevenoaks Gap in the North Downs. They branch at Tonbridge, the Hastings line passing through *Tunbridge Wells*, an inland holiday centre with medicinal springs. It lies in the hilly country of the Central Sandstone heights. The Folkestone line between Sevenoaks and Folkestone lies along the Weald clay Vale of Kent.

V.—THE HAMPSHIRE BASIN.

The Hampshire Basin, which includes the Isle of Wight, lies south of Salisbury Plain, and extends from the Dorset Heights in the west to the South Downs in the east (see Fig. 43). Its geological features repeat those of the London Basin, for it is a great trough of chalk filled with clay and sands. The chalk of Salisbury Plain and of the Dorset and South Downs dips beneath the younger clays and sands and reappears in the Downs of central and southern Isle of Wight. The lowest part of the basin, corresponding to the line of the Thames in the London Basin, is occupied by arms of the sea, the Solent and the Spithead, for extensive sinking and wear and tear of the coast have taken place. Formerly the Solent and the Spithead were parts of the valley of

the Frome river, and the old coastline probably was as shown in Fig. 44. The chalk ridge of the Isle of Wight is undoubtedly a continuation of the chalk ridge of Dorset which reaches the sea between Swanage and Poole Bay. This is emphasized by the Needles, isolated pinnacles of chalk in the extreme west of the Isle of Wight. The Dorset chalk ridge just mentioned forms part of the so-called Isle of Purbeck, a beautiful district where ridges of chalk and limestone run parallel to the sea. At Lulworth a belt of hard rocks faces the sea.



FIG. 43.—The Hampshire Basin.

The famous bottle-necked Lulworth Cove has been made by the breaching of these hard rocks by the sea, which then ate into the softer measures behind. In the same way the sea breached the chalk belt which once joined the Isle of Wight to the mainland, and swept away the softer materials behind it (see Fig. 20). West of the Isle of Purbeck is the island of Portland, which has been tied to the mainland by the shingle Chesil Bank, or Beach, built up by the action of the tidal currents. Portland Island is composed of oolitic limestone, which is frequently exceedingly good for building purposes. It is quarried by convicts quartered at the

great prison located on the island. Stone-quarrying is carried on in many places in the oolitic scarps, *e. g.* Bath, Cheltenham, and Ancaster (Lincolnshire). Oolitic limestone has the great advantage of being readily shaped by cutting with a saw.

OCCUPATIONS OF THE HAMPSHIRE BASIN.

A very important difference must be noted between the occupations of the chalk, the clay and the sand

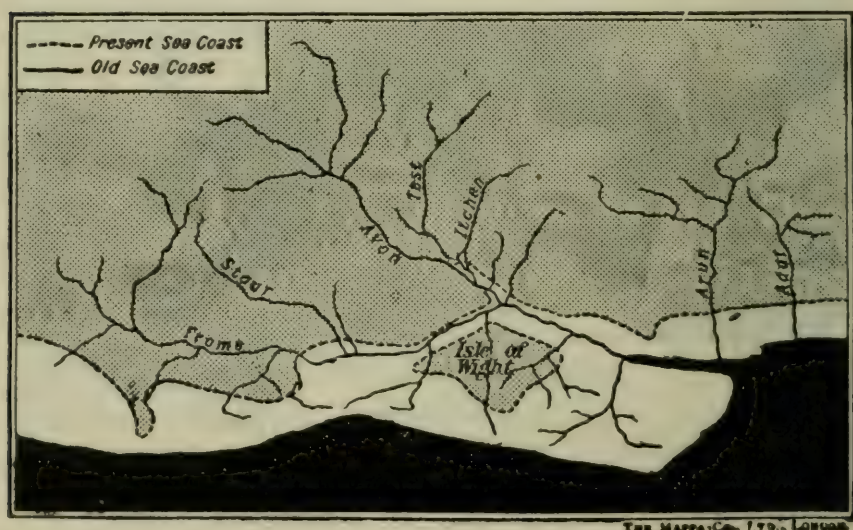


FIG. 44.—The former coastline of the central part of Southern England.

areas. The chalk downs and the upland of Salisbury Plain form, on the whole, not only poor agricultural lands, but are also very poor in useful minerals. *Salisbury Plain* resembles a low plateau, and in parts presents a very level appearance, especially in the vicinity of Stonehenge, perhaps the oldest human monument existing in the country. On the higher parts the soil is generally very thin and poor, trees are very rare, and the land is of little value except for the rearing of sheep. These features, however, make the Plain a splendid ground for the training of armies, and

for this purpose it is very extensively used. But the larger river valleys often contain rich deposits of alluvial soil, which make it possible for dairy-farming and agriculture to be carried on.

The sand areas are usually covered with heath or are forested. *The New Forest* is a typical sandy region. It lies west of Southampton Water and contains not merely forests of oak and pine, but also open stretches of heathland and grassland. Although the existing forests of both the Hampshire Basin and the Weald are on sandy soils it must not be supposed that these soils always supported the densest forests. Indeed, it is almost certain that the clay lands were formerly much more densely forested than the sandy lands. In the New Forest the rearing of ponies and swine is carried on.

The clay areas, and also many sandy districts, are rich agricultural and pastoral lands, whose products resemble those of the clay vales of the Weald. Thus, fruit, wheat, root-crops and dairy produce are all important. So mild is the climate of the Isle of Wight, so luxuriant the natural vegetation, and so productive the soil, that the island is frequently called "The Garden of England." It is visited annually by large numbers of holiday makers who form an important source of wealth. *Cowes*, famous for its regatta, stands on the Solent, opposite Southampton Water. It has a small shipbuilding industry. *Ryde*, *Sandown*, *Shanklin* and *Ventnor* are popular holiday resorts. *Newport* occupies a central position at the head of the broad estuary of the Medina. *Bournemouth*, one of the most popular of south-coast holiday resorts, was about sixty years ago a small fishing village. It stands east of Poole Harbour, and owes its rapid growth and popularity to its firm sands, its mild winter climate—for it is especially popular as a winter resort—and its beautiful pine-woods. *Swanage*, like Portland, is famous for its building stone. It is also a holiday resort.

ROUTES AND TOWNS OF THE HAMPSHIRE BASIN.

The natural route from the English Channel into the interior is by way of the Solent or the Spithead to Southampton Water. *Southampton* stands on the piece of land between the mouths of the Test and the Itchen, so that it has a double water-front, whilst owing to the position of the Isle of Wight at the entrance to Southampton Water, the tides come up the Spithead two hours later than up the Solent, so that the port has the great advantage of having double tides daily. This has the effect of prolonging the period of high tide, and prevents the water from falling very low, thus making the harbour peculiarly accessible to ships and giving it a great advantage over other ports, particularly London. In many ways, especially for mails, passengers, and such valuable African products as gold and diamonds, *Southampton* is really an out-port of London. Owing to its position with regard to the great military training camps of Aldershot and Salisbury Plain, it is also an important military port. The principal destinations of ships using Southampton port are indicated on Fig. 45.

On Spithead, at the entrance to an almost landlocked harbour, stands *Portsmouth*, the chief British naval dockyard. The town became a royal dockyard in Tudor days, when ships were built of wood, and, despite the fact that it is far from coal and iron fields, and that it is not on the coast which is now most in danger of attack, the start it received has enabled it to maintain its position.

From Southampton Water three main routes lead into the interior (see Fig. 43). The first strikes westward to the Frome valley and *Dorchester*, the second north-westwards to *Salisbury*, and the third north-eastwards to *Winchester*. All three of these towns have grown up at the point where their respective rivers leave the chalk uplands for the lowlands of the Hampshire Basin. Salisbury, upon which several rivers and the routes following them converge, has one of the most beautiful

cathedrals in the world. Winchester, on the Itchen, was once the capital of England.



FIG. 45.

Communication between the Isle of Wight and the mainland is maintained from Southampton and Portsmouth. *Weymouth*, sheltered by Chesil Beach, is both a pleasure resort and, like Southampton, a packet-station for the Channel Isles.

THE CHANNEL ISLES.

These islands are all that remain of the former English possessions in France. Physically they are part of France, from whose coast they are only about ten miles distant. They are composed of ancient, hard rock which has weathered into a very rugged coast with steep cliffs, which together with the dangerous sea currents make landing operations no easy task. Their mild climate, with rain at all seasons, is very suitable for grass, and dairy-farming (Jersey and Guernsey cattle are famous) and the production of early vegetables, tomatoes and flowers have become the leading industries. Fishing, the oldest occupation, is carried on, and surplus fish are extensively used for manure. Jersey, Guernsey and Alderney are the largest islands, and *St. Helier* (Jersey) and *St. Peter's Port* (Guernsey) the chief towns. The inhabitants, who number about 95,000, speak French far more naturally than English.

SOUTH-WESTERN ENGLAND.

PHYSICAL FEATURES.

South-western England is a peninsula comprising the greater part of Somerset, western Dorset and the whole of Devon and Cornwall. The Mendip Hills of North Somerset form a complete upfold of carboniferous limestone separating the Plain of Somerset from the basin of the Bristol Avon. Like the Pennine Chain they contain many caves and other phenomena associated with carboniferous limestone areas. The noted Cheddar Gorge was probably formed from a series of caverns worn out by underground streams. The collapsing of the roofs of these caverns has resulted in the formation of a steep-sided gorge. East of the Mendips the oolitic limestone of the Cotswolds is continued

through western Dorset to the coast, where it forms Portland Island.

Between the Mendips and the Quantocks, outliers of Exmoor, lies the *Plain of Somerset* (see Fig. 46). This low, flat plain, across which the Parret and other rivers sluggishly find their way to the Bristol Channel, has many points of resemblance to the Fens. It is formed of alluvium and was once in a swampy, water-logged

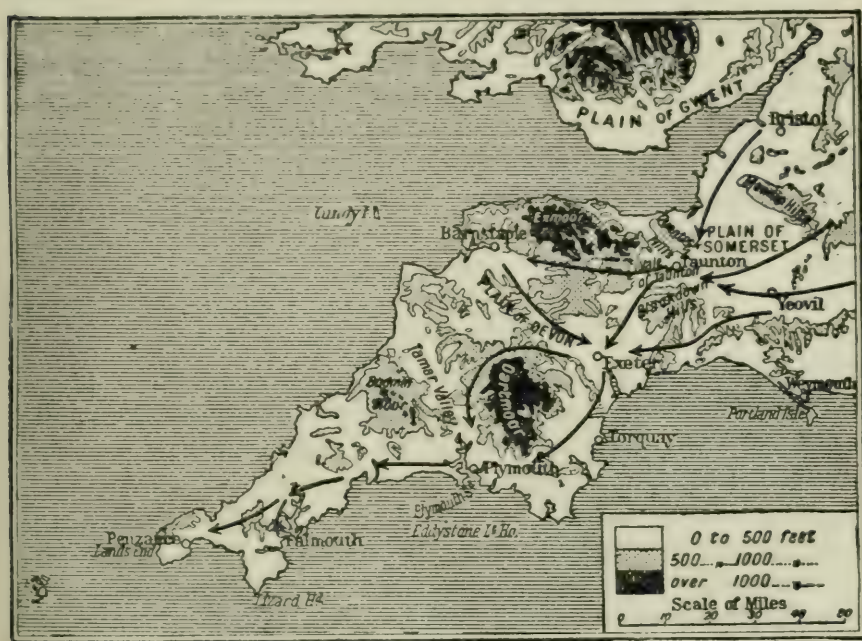


FIG. 46.—Relief and Routes of South-western England.

state. The historic Isle of Athelney, where Alfred the Great sought a refuge, may be compared to the Isle of Ely, the Fenland refuge of Hereward the Wake. It stands only a few feet above the general level of Sedgemoor; and in Alfred's time must have been surrounded by an almost impassable swamp.

The rest of south-west England falls very naturally into a series of belts of high ground alternating with belts of lowland. Exmoor and the Blackdown Hills form a high belt, succeeded by the Plain of Devon,

which stretches from Barnstaple Bay to the mouth of the Exe, and is drained north-westwards by the Torridge and the Taw and south-eastwards by the Exe. A second high belt reaches from Hartland Point to Start Point, attaining its greatest elevation in Dartmoor. Then follow the lowlands of the Tamar, which are succeeded in turn by the highland of Bodmin Moor. The rest of the peninsula may be regarded as another lowland area.

South-west of an irregular line from the Quantock Hills to the mouth of the Teign the rocks are very old—all older than coal—and mostly very hard. The most prominent features are formed either by the slates, limestones and sandstones of Exmoor, or the granite of Dartmoor and Bodmin Moor. *Dartmoor*, the most extensive mass of granite in England, is a plateau whose highest points just exceed 2,000 feet above sea-level. Yes Tor (2,028 feet) exhibits a common Dartmoor feature. The joints in the granite are very widely separated, so that it splits and weathers into large, tabular-shaped blocks called Tors, of which there are over one hundred and fifty on Dartmoor alone. Although granite is one of the hardest of rocks, it is readily disintegrated by rainwater containing carbonic acid acquired from the air. This acts upon feldspar one of the constituents of granite, dissolves it, and thus sets up the decay of the rock and finally reduces it to a stiff clay, the famous kaolin or china clay. This clay is of considerable commercial importance, but it has the harmful effect of keeping the surface sufficiently damp for the formation of bogs. Even in this connection, however, we must note that it is the boggy character of the moor which makes it a suitable place for the establishment of a great convict settlement, for escape is exceedingly difficult. Bodmin Moor is less extensive and lower in height, but it repeats the main features of Dartmoor.

Towards the south-west the peninsula becomes lower, and ends in the granite cape of Land's End and the rarer igneous rock, called Serpentine, of the Lizard.

About twenty-five miles further south-west the peninsula reappears in the *Scilly Isles*, a group of some 150 granite islands and rocks, of which only five are inhabited. The sinking of south-western England has drowned the lower valleys of most of the rivers, producing the magnificent rias of Falmouth and Plymouth Sounds (*cf.* Kenmare River, Dingle Bay, etc., in south-west Ireland). But although there is evidence of extensive sinking, there is also reason to believe that at times uplift has also occurred in certain places, for the presence of raised beaches and shelves, cut into the land by the action of the waves when the land stood at a lower level, bears witness to this.

Lundy Island, an isolated volcanic island, is an outlier of Exmoor, which probably at one time extended further westwards.

OCCUPATIONS OF SOUTH-WESTERN ENGLAND.

The leading occupations show a very close connection with geographical conditions. *Fishing* is a natural occupation in a region with so many fine harbours. The sailors and fishermen of south-west England have won for themselves a great name in British history. It was from its ports, and particularly from Barnstaple, Bideford, Falmouth and Plymouth, that such great Elizabethan seamen as Raleigh, Hawkins, Drake and Gilbert sailed, either to attack and plunder the treasure-ships of Spain, and to defeat her great Armada, or to attempt the founding of English colonies in the New World. To-day, St. Ives and Penzance are centres for the mackerel and pilchard fisheries, and Brixham, on Tor Bay, and Falmouth are centres of the trawl-fishing industry.

In the highland areas there is much waste land, particularly on the granite moorlands and on Exmoor. Mining, quarrying, the exporting of kaolin, and the rearing of animals are the chief occupations associated with the highlands. Mining for tin and copper has been carried on from time immemorial, the mines having been visited by Phœnicians, Greeks and Romans. Very

little tin and only a comparatively small amount of copper are now obtained, as most of the lodes and veins which formed in the cracks on the margins of the great granite masses have been worked out. At Truro, St. Just (west of Penzance), and at Bodmin, the county town of Cornwall, these ores are still mined and sent to South Wales to be smelted, although a small amount is smelted by coal brought from South Wales. Granite and slate are extensively quarried and exported, whilst kaolin is exported by sea from Fowey and Teignmouth to the Mersey, where it is chiefly sent by canal to the Potteries, but also to the cotton mills of Lancashire. Hardy ponies run wild on Exmoor and Dartmoor, and are sold, happily in decreasing numbers, for work in coal-mines. Sheep-rearing is associated with the Mendips and the hills of the oolitic "streak" to the east, and in both cases small woollen industries have been fostered, in the first case in the Frome valley, and in the second at Axminster, which has given its name to carpets now chiefly manufactured elsewhere.

But, despite the large extent of waste land, southwestern England is essentially agricultural. Its lowlands, and particularly the Plains of Somerset and Devon and the Vale of Taunton, are suitable not only for the growing of fruit and cereals, but also for dairy-farming, facts which are borne out by the fame of Cheddar cheese, Devonshire cream, Devonshire cider, etc. The richest part of the Devonshire plain is the New Red Sandstone vale of the Exe, noted for its red cattle and its red cider apples. The southerly position and the oceanic influences which are everywhere felt make southern Cornwall and the Scilly Isles exceedingly suitable for the cultivation of early flowers (narcissi, daffodils, lilies, etc.) and vegetables, especially potatoes, asparagus, etc. The prices obtained for these early products are so high, that it is easily possible to bear the cost of railway transit to distant large centres of population.

There is another industry which probably ranks first in point of the numbers dependent wholly or partially upon it. It is the catering for the needs of the large

numbers of visitors who are attracted to the south-western peninsula, either on account of its mild climate or the magnificent coast and inland scenery. The mild winters make the Cornish and Devon coasts very well suited for invalids, and many coastal towns have become famous winter health resorts, particularly *Torquay*, on Tor Bay. On the coast of North Devon, the magnificent coastal scenery along the margins of Exmoor, and the beauty of the wooded glens which open from that heather-clad tableland to the sea, have made *Ilfracombe*, *Lynton*, and other smaller places very popular summer resorts.

TOWNS AND ROUTES OF SOUTH-WESTERN ENGLAND.

Before the drainage of the Plain of Somerset south-western England was almost cut off from communication with the rest of England, except by sea. Three main railway lines enter the peninsula. From Bristol and the lower Severn basin on the one hand, and from the valley of the Kennet and the lower Thames Basin on the other, two lines, both belonging to the Great Western Railway, converge upon Taunton after having passed round the western and eastern margins of the Mendips. *Taunton*, a very important west-country route centre, stands on a tributary of the Parret in the vale of Taunton, a fertile lowland lying between the Quantock and Blackdown Hills. A branch line runs to Barnstaple, Bideford and Ilfracombe. The main line proceeds to Exeter along the plains between Exmoor and the Blackdown Hills. There it meets the London and South-Western line, which takes the route south of the Blackdowns. *Exeter*, a Roman city, stands at the head of the estuary of the Exe, a position which commands many routes (see Fig. 46). It is the county town of Devon, and is sometimes spoken of as the Capital of the West Country. Proceeding south-westwards from Exeter, the great mass of Dartmoor presents such an obstruction that the London and South-Western Railway follows its northern margins and sends an offshoot to Barnstaple and

Bideford, whilst the Great Western Railway line works round its southern borders calling at Torquay on the way. The lines meet again at *Plymouth*, the great naval station on the magnificent sound of the same name. Plymouth, with Devonport and Stonehouse (the "Three Towns"), is the largest, and in many respects the finest, city in south-western England. All traffic, passing down the Tamar valley and along the lowlands south of Bodmin Moor and north and south of Dartmoor, converges upon the city. It is a port of call for ocean liners, and is particularly important as a mail port. Out to sea, opposite the entrance to Plymouth Sound, stands the noted Eddystone Lighthouse. From Plymouth, after crossing the sound by the famous Saltash Bridge, the joint line proceeds south-westwards through *Truro* to *Penzance*. From Truro a line serves *Falmouth*, an important shipping and trawl-fishing port, situated at the entrance to the beautiful estuary of the Fal.

EXERCISES.

1. What contrasts are there between the parts of Britain which lie on either side of the Tees-Exe Line?
2. What would be the leading changes which would occur in the coastline of the British Isles if they were (a) submerged 100 fathoms, (b) uplifted 100 fathoms?
3. On maps of the British Isles on which the outlines of the counties have been traced, shade the counties to show the distribution of arable and pasture land, of cattle and sheep, and of wheat, using such statistics as are available in the returns published by the Board of Agriculture. Take particular pains with the choice of index to each map.
4. Account for the positions of the chief coalfields of northern England. What industries are carried on in each area? Why are these particular industries followed?
5. Into what three natural divisions may Scotland be divided? What are the leading physical characteristics of each?
6. On an outline map of Scotland shade the land over 600 feet. On the same map mark the coalfields, and also shade the map to show the distribution of the population according to the following index; wide dots where the population is very small, *i.e.* less than 50 per square mile; horizontal lines from 50 to 250; and horizontal and vertical lines for over 250. Account for the facts brought out by this combination of data.

WESTERN COUNTIES.

7

County.	Cultivated Land per 1000 acres.	Wheat Land per 1000 acres.	Sheep per 1000 acres.	Cattle per 1000 acres.
Ayr . .	208	1	490	141
Renfrew . .	271	12	281	165

EASTERN COUNTIES.

County.	Cultivated Land per 1000 acres.	Wheat Land per 1000 acres.	Sheep per 1000 acres.	Cattle per 1000 acres.
Haddington . .	532	37	742	57
Edinburgh . .	364	21	770	87

What differences between the western and eastern counties of the Central Lowlands do these figures illustrate? Account for them.

8. What are the leading features of the relief of Ireland? How has the river system been affected by them? Why are bogs and lakes common features of Irish topography? How can bogs be reclaimed?

9. Compare the distribution of the population of Ireland with that of Scotland. Give reasons for the marked decline in the population of Ireland during the last sixty years.

10. Draw the following maps of Wales: (i) Relief, routes and coalfields; (ii) relief, coalfields and distribution of population; (iii) relief and the distribution of cattle and sheep. For relief shade land exceeding 600 feet. In order to indicate the distributions of people, cattle and sheep, mark the county boundaries and obtain the statistics from a book of reference. Add written descriptions to each map.

11. Compare the present and past importance of the ports of Bristol and Liverpool. What geographical factors have affected them?

12. What evidence is there for believing that the upper and middle Severn were formerly the upper Thames? Account for the direction taken by the Bristol Avon in different parts of its course. Make a map to illustrate the account given on p. 116. Where are there gorges in the Basin of the Severn? Where broad plains? Give reasons.

13. How far is Birmingham from Liverpool, Hull, London, and Bristol? State the advantages and disadvantages of each of these ports with regard to their trade with Birmingham.

14. Describe a chalk down; a fen country; a rich clay plain. Show what connections exist between the physical and climatic

conditions on the one hand and the occupations of the people on the other.

15. Draw a map of the mouth of the Alde. Originally the mouth must have been at Aldeburgh. In the sixteenth century it was at Orford. Account for these changes. Also find out about the structure of Lowestoft Ness, and of the extensive coast erosion at Dunwich.

16. What are longitudinal and transverse valleys? What are water gaps? Wind gaps? Illustrate your answer from the Thames Basin.

17. Draw a large-scale map of the Chilterns, marking very carefully the railways which cross them, the gaps which the railways utilize, and the towns which control them.

18. On the railway line between London and Brighton where would you expect to find (a) level stretches of line, (b) cuttings or tunnels? Give reasons.

19. Many of the parishes in the neighbourhood of Reigate are long, narrow, north and south strips of country, and include portions of chalk, clay and sandstone areas. Why is this?

20. Write a brief account of the relief of south-western England, and show how the chief lines of communication are related to relief.

21. Why is it that : (i) West-country sailors were so famous in Elizabethan days? (ii) Cornish miners are found in almost all the great mining regions of the Empire? (iii) Cornwall and Devon have so many winter resorts?

22. Find out from a book of reference, the chief imports and exports of the United Kingdom. What proportion of the total trade is carried on with parts of the Empire? In what commodities do you think the Empire could be almost, or quite, self-supporting? For what commodities is the United Kingdom largely dependent upon foreign countries? Do you think it would be a good thing if the British Empire aimed at being self-supporting, at least as far as possible?

PART III

EUROPE

GENERAL PHYSICAL AND REGIONAL CONDITIONS.

EUROPE forms the western part of the great land-mass of Eurasia, and on purely physical grounds it is closely bound to Asia, but climatically, economically and politically it is clearly marked off from its eastern neighbour. In latitude, it extends from 35°N. to 71°N. , so that it lies almost entirely within the temperate zone, with most of its mass rather nearer the North Pole than the Equator. Its northern shores just reach within the region of Arctic ice and snow, whilst in the south it falls short of the Saharan heat and drought. The northern, western and southern shores of Europe are washed by arms of the ocean, and only on the east are there land frontiers. The position of the Continent with regard to the great sea routes is a matter of first-class importance, for the fact that the sea routes to the Atlantic, to Africa, and to the Far East via the Mediterranean pass along its shores has had a great deal to do with the commercial importance of European countries, particularly of those on the western margins.

RELIEF AND STRUCTURE.

Considering only the distribution of highlands and plains, without any regard to structure, a glance at the physical map of Europe is sufficient to show that it falls into three main physical divisions. The first of these is

the *North-Western Highlands*, found in Scandinavia and in western Britain. A second division is the great belt of the *Southern Highlands*, stretching right across Southern Europe from west to east, including mountain ranges like the Alps and the Carpathians, and plateaus like the core plateaus of France and Spain. The third division is the *Central Lowlands*. In the east this vast lowland stretches from the Arctic Ocean to the Black Sea, but towards the west it narrows in Holland and Belgium, and then turns south-westwards until it abruptly ends at the base of the Pyrenees. But the beds of the shallow Baltic and North Seas are really parts of this lowland, so that it must be looked upon as extending westwards to the mountains of Britain.

A physical map will show that both the central lowlands and the southern highlands are prolongations of the physical features of Asia, a fact which emphasizes not only the physical connections between Europe and Asia, but also the peninsular character of the former continent.

Structure.—If, however, we also include in our classification a consideration of the *type* of highlands, whether fold mountains or block-plateau highlands, of the type of lowlands, whether of horizontally bedded sheets of rocks, or of alluvium or glacial waste, etc., it will be necessary to group in rather different fashion. The first great structural division of Europe is the *Ancient North-Western Region*, which includes not only the North-Western Highlands, but also the peneplain of Finland. This region, comprising western and north-western Britain, Scandinavia and Finland, is a very ancient landmass which has been greatly worn down, faulted, sunken and glaciated, both remotely and recently. Along its margins are many lowlands of waste material brought down by ice-sheets, or of alluvium carried by rivers from their sources in the Alps or the highlands of central Europe. Examples of such lowlands are the Netherlands, Denmark, southern Sweden and the North German Plain.

South of this region there lie the *Highlands of*

Central Europe, a belt or zone of ancient plateaus and basins, where the greatest complexity exists. To this belt belong the Meseta, the plateau-core of the Iberian Peninsula, the central plateau of France, and the complicated system of highlands in central and southern Germany and Bohemia (see Fig. 47). Some of these highlands are plateaus of upraised blocks of the earth's crust, some are ancient folded mountains which were denuded to a peneplain and then uplifted, fractured or tilted. We shall find that this complicated highland system is very rich in minerals, for the best coal and most ores are encountered in ancient rocks where earth

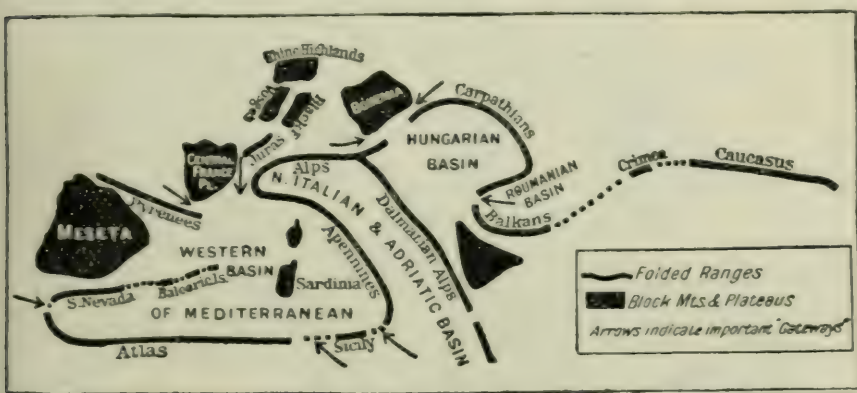


FIG. 47.—The Folded Ranges and Block Mountains of Central and Southern Europe.

movements and denudation expose mineral deposits and render mining operations comparatively easy.

The third great structural division of Europe is the *Russian Plain*. This consists of vast horizontal sheets of ancient sedimentary rocks, which for ages have remained undisturbed by the forces which in other parts of the Continent have been at work in altering the face of the land. The Urals are structurally connected with the North-Western Highlands, for the rocks of those highlands pass beneath the sedimentary measures and reappear to form the Urals.

The fourth division comprises the *Folded Ranges of Southern Europe*. When the rocks were buckled and

crumpled to form these mountains, there must have been extensive subsidences along the fringes of the folds. In this way the depressions of the two basins of the Mediterranean, of northern Italy and of the Hungarian Plain were formed. Fig. 47 traces these folded ranges and indicates their connection with the mountain systems of north-western Africa and southern Asia.



FIG. 48.—Europe: January and July mean sea-level isotherms.

CLIMATE.

Temperature Conditions. Fig. 48 gives the mean sea-level isotherms for January and July. The isotherm of 32° F. should be particularly noted, for that is the temperature at which water freezes. Its path clearly demonstrates the influence of the warm waters of the North Atlantic drift, and of the warm south-west winds

which blow from ocean to land. As in the case of Britain, winter temperatures fall as we go eastwards away from the warm ocean. In July, the isotherms roughly run from west to east, but there is a marked northerly trend the further east they go, due to the fact that in this month the land masses are warmer than the seas in the same latitude. In January, only the extreme



FIG. 49.—Europe : Mean annual rainfall.

south has a mean monthly temperature exceeding 50° F. ; in July, only in the extreme north does the temperature fall below this amount. Considering the January and July isotherms together, it is evident that in both months the warmest temperatures are experienced in the Mediterranean region, that the least range of temperature is found along the western margins, and the greatest range in the east and particularly the north-east.

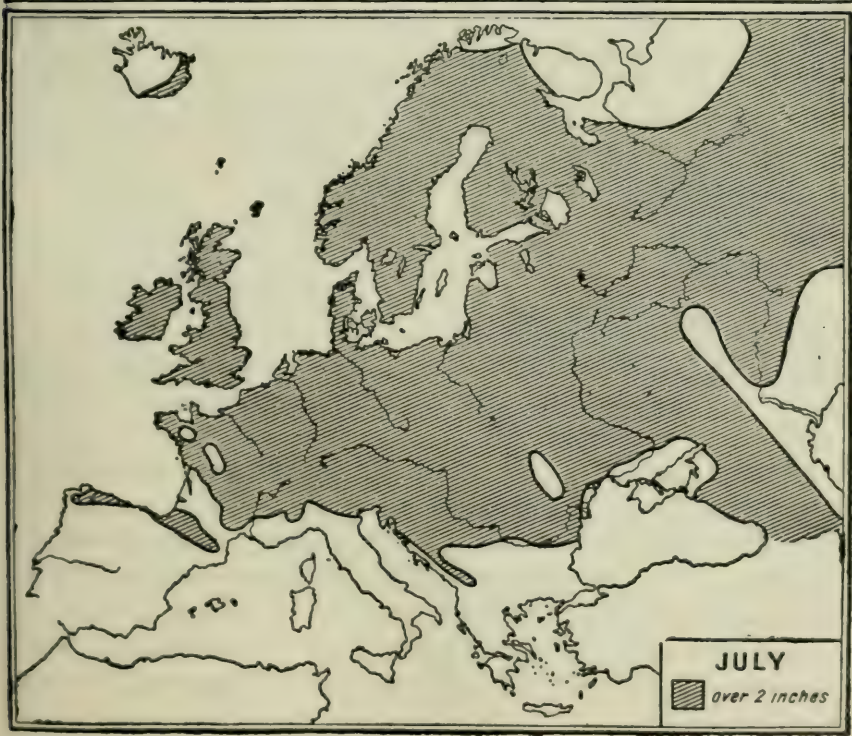
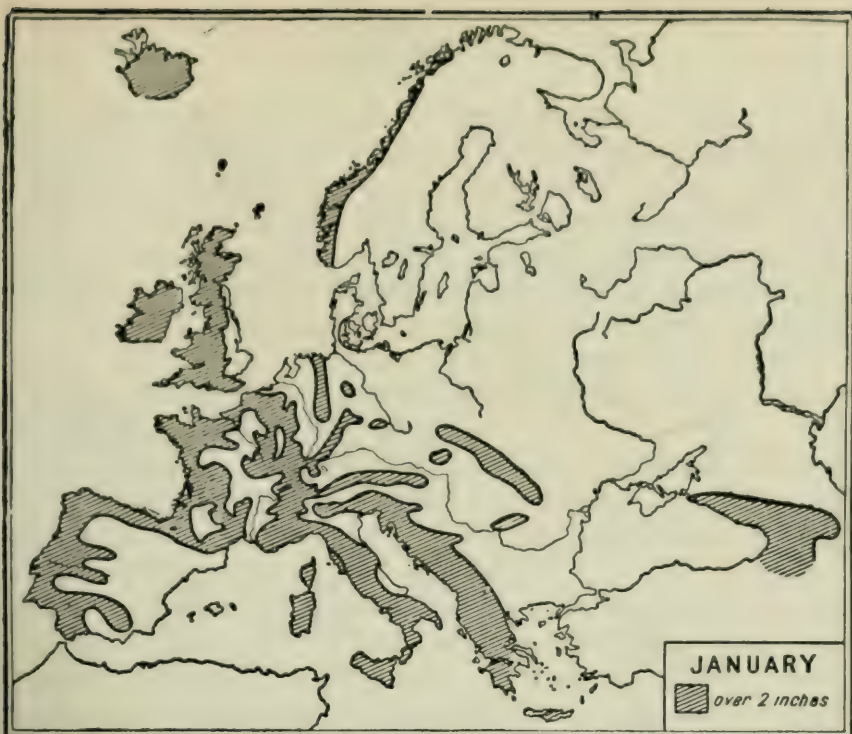
Rainfall Conditions.—If the mean annual rainfall map (Fig. 49) is compared with a relief map, the close connection between the two sets of factors is at once apparent. The rain-bringing winds are the prevailing westerlies, hence the decrease of rainfall as we go eastwards. The effect of an encircling chain of highlands is also markedly illustrated in the case of the relatively dry Hungarian plains.

As regards the seasonal distribution of rainfall, Europe may be classified into three main divisions, as will be seen by comparing the two maps in Fig. 50. In the interior and east of the Continent rainfall occurs chiefly in summer, when moisture-laden winds from the ocean can reach such distances from the sea owing to the low-pressure systems developed over the heated land mass of Eurasia. In winter the cold air cannot contain much water vapour, whilst the winds outflowing from the prevailing high-pressure areas over the lands prevent the ocean winds from reaching the interior of the Continent. Western Europe, from the Cantabrians to northern Norway, is in the track of the prevailing westerlies at all seasons, and therefore has rain at all seasons. The Mediterranean region has rain in winter, for only at that season is it in the belt of the prevailing westerlies.

NATURAL VEGETATION.

In Europe, more than in any other continent, the natural vegetation has been altered by man, so that over large areas the type of natural vegetation shown on Fig. 51 now only exists in samples. For instance, vast areas of forests have been removed from western and central Europe, and extensive tracts of Hungarian and Russian grassland have long since been ploughed, and in modern times produce rich harvests of cultivated grasses, *e.g.* wheat, etc.

Tundra.—Vegetation of this type is found in the extreme north, where the winters are long and severe, the summers short and warm, and the total precipitation is less than ten inches per annum. Here the ground



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FIG. 50.—Europe: Areas where the mean rainfall exceeds two inches in January and July.

never thaws below a depth of a foot or so, so that trees cannot grow, and the only vegetation consists of mosses, lichens, and small berry-bearing plants and shrubs, such as crowberries and cranberries, which are found along sheltered water-courses. Southward extensions of the tundra are found on the Scandinavian highlands and the Ural Mountains.



FIG. 51.—Europe: Map of natural vegetation.

The Forests.—Forests of the cool temperate variety stretch right across Europe in a broad belt south of the tundra. In the north the trees are conifers, chiefly, pines and firs, for only such sturdy trees could withstand the severe climate. These forests are of great economic value, not only for the timber and the products derived therefrom, but for the furs of the animals which they shelter.

Towards the south the conifers give way to deciduous

trees such as oaks, beeches, elms, etc. These once formed dense forests on most of the lowlands of western and central Europe.

In the Mediterranean region the forests are of the type found in western margins of warm temperate lands, and may be compared with those of the Atlas region in Africa. All the trees are evergreens—oaks, walnuts, olives, etc.; and are adapted in some way, *e.g.* by striking deeply, or by the provision of small dry leaves, to withstand the summer drought.

Steppes and Semi-Desert.—In south-eastern Europe the insufficient rainfall, helped in some cases by the porous character of the soil, sets a limit on the growth of trees, and vast stretches of temperate grasslands, called steppes, are found. Vast areas of the wetter steppe are now ploughed, and wheat and other cereals are produced; but on the drier parts the prevailing occupation is the rearing of cattle, sheep, horses and goats, and the type of life is nomadic. Towards the Caspian Sea the rainfall decreases, so that the steppe merges into semi-desert and in places into true desert. The Hungarian Plain—the *puszta*s—is a portion of the steppe cut off by the Carpathians.

Mountain Associations.—On the mountains of Europe the vegetation differs according to position and height. Thus, on the northern Scandinavian highlands, the elevation and the high latitude make it impossible for any vegetation other than tundra to exist. Mountains of moderate elevation in Central Europe, *e.g.* the Carpathians, are forested to their summits, whilst the higher Alps and Caucasus lift their heads sufficiently high to stretch beyond the tree limit, through the mountain pastures resplendent in spring with alpine plants, and the zone where vegetation of the tundra type is found, to the fields of everlasting snow and ice.

EASTERN EUROPE: THE RUSSIAN LANDS.

PHYSICAL FEATURES.

Eastern Europe is a vast plain stretching from the Carpathians to the Urals, from the Baltic and White Seas in the north to the Black and Caspian Seas in the south.

The ancient rocks of the Scandinavian Peninsula reappear in Finland, but dip below the great sheets of undisturbed sedimentary rocks forming the Russian plain and finally appear once more in the Urals. The rivers of the plain have produced what irregularity of surface there is, and in wearing out their valleys have left low ridges which form the watersheds.

In Finland and in northern Russia there are many signs of recent glaciation. If a curved line be drawn from Warsaw to Archangel it will be seen that to the north-west of it we have a region of lakes, of complicated river systems, and, if a map showing surface drifts be consulted, of boulder clay. Now let another line be drawn from about the centre of the Carpathians through Kiev and Kasan to the Urals. Between the two lines there is another boulder clay covered region which was glaciated in more remote times. The map shows that the lakes have disappeared, but the land is not by any means drained, for some of the river lowlands are vast marshes, *e.g.* the famous Pripet marshes. South of the second line lies the famous *Black Earth Lands*, Russia's richest agricultural region. Here we have exceedingly rich loess deposits enriched by the decay of the natural vegetation of ages (see Fig. 52).

Towards the south the Black Earth ceases along a line roughly running from the south-eastern bend of the Carpathians through Ekaterinoslav and Orenburg to the southern end of the Urals.

CLIMATE.

The cold of the winter and the heat of the summer are very well marked. In winter only a very small part

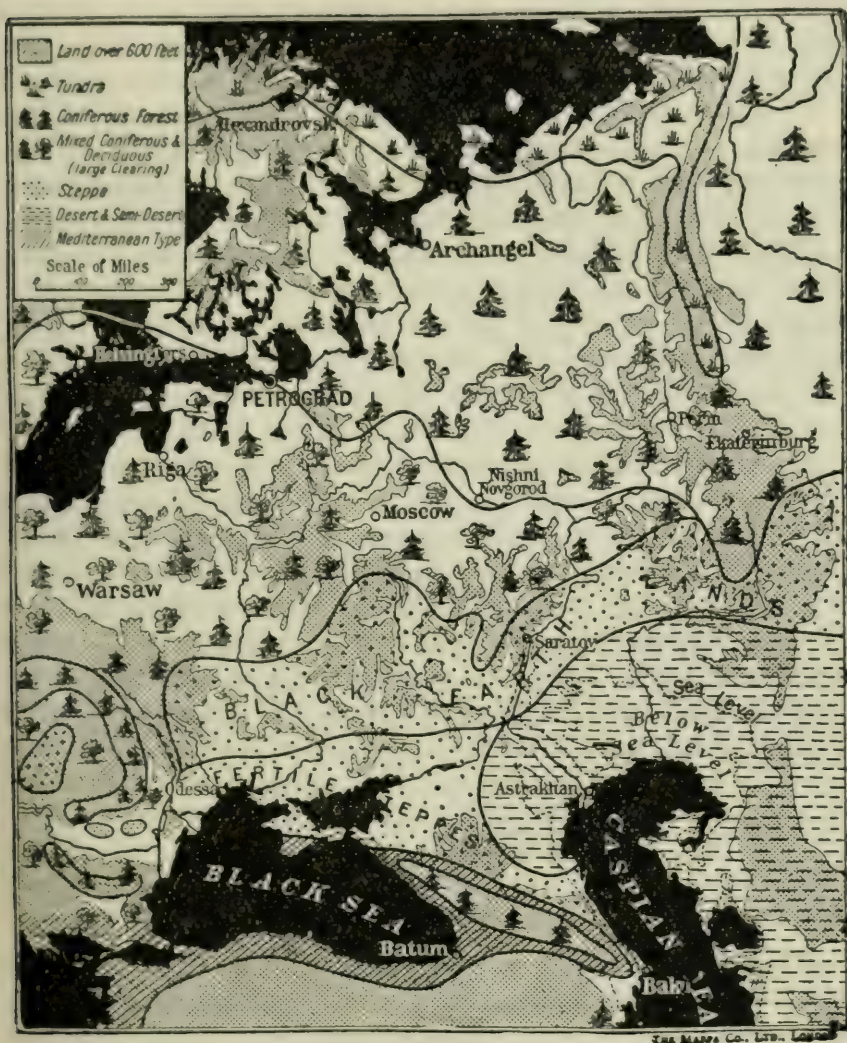


FIG. 52.—Eastern Europe.

of the country, southern Crimea and Trans-Caucasia, has a temperature above freezing point, whilst over the greater part of the country the temperature falls much below freezing point.

As regards the distribution of rainfall, most precipitation occurs in the west and centre (see Fig. 49), where a mean annual fall of from twenty to thirty inches is experienced. Towards the north, the south and the south-east, the amount rapidly decreases, and in places falls below ten inches, which, without irrigation, means desert conditions.

These climatic conditions exercise a tyranny over the people. In the long, cold winter, outdoor work is impossible, and, except in the towns, work is practically at a standstill. Summer is the season of maximum energy, when the Russian peasant and his family must work hard to provide the necessities of life. At that season even young children have an economic value, and most of them are required to assist in the fields. Not only this, but there is also a movement of the people from the towns to the fields, a feature of much concern to the manufacturers of Moscow and other towns, since the workpeople in the cotton and other mills are constantly changing. In winter, the bitter cold, the frost-bound condition of large areas, and the isolation of thousands of villages, make it very difficult to send children to school. Therefore can it be wondered that in 1913 it was estimated that between seventy-five and eighty millions of Russians could neither read nor write?

NATURAL REGIONS.

(1) THE TUNDRA.

This region roughly lies north of the 65th parallel. Its few inhabitants are engaged in fishing, hunting, and in breeding the semi-domesticated reindeer. In the lower basin of the Dwina, which includes both tundra and forest, the inhabitants are engaged in preparing oils (from the products of Arctic fisheries); tar, pitch and timber (from the forests); and in trading in furs, skins and tallow. The centre of this trade is *Archangel*; the oldest, and once the only, Russian port.

Unfortunately it is only ice free for about one hundred and seventy days each year, so that its sea-borne trade is concentrated upon the summer months.

(2) THE FORESTS.

This broad region may be subdivided into : (1) The Baltic Region, (2) the North-Eastern Forests.

(1) *The Baltic Region.*—*Finland*, now independent of Russia, consists of an undulating low plateau of granitic and crystalline rocks which have been heavily glaciated, hence its innumerable lakes. These cover one-third of the surface. In the north it forms part of the tundra, but the bulk of the country is covered with forests—chiefly coniferous—whose clearings are rich meadows noted for their dairy-farming. The most densely peopled part of the country is, however, the small area in the south-west, where forests of the leaf-fall, *i.e.* deciduous forests, predominate. The rivers follow intricate courses, but many of them have sufficiently steep gradients to produce waterfalls which provide power for lumber, paper and pulp mills. In all these respects Finland closely resembles southern Scandinavia. The capital is *Helsingfors*, on the Gulf of Finland, opposite Reval. It has a splendid deep-water harbour protected by an island. *Abo*, the old capital, has an important strategic position near the Åland Islands “bridge” to Sweden. Iron ore is mined in southern Finland, and Åbo is engaged in shipbuilding. The humid climate of the south-west, the abundance of water-power, and the presence of good harbours have led to the development of cotton manufacturing, which is chiefly centred in *Tammerfors*, a town possessing all these natural advantages.

Estonia, Latvia, Lithuania and Poland, like Finland, are forested lake lands. But structurally they form part of the Great Central European Plain, and thus have resemblances to the adjoining plain of north Germany, particularly as regards their poor glacial soil, and the crops (hemp, flax, beet, rye and potatoes), which are

grown in the extensive forest clearings. As in Germany these products are made the basis of industries, *e.g.* sugar from the beet, alcohol and starch from potatoes, linen manufacturing from the flax. In the forests the timber is cut down and floated down the rivers to the ports, *e.g.* Riga, at the mouth of the western Dwina. Estonia, Latvia and Lithuania once formed part of a Swedish Baltic Empire, but they were conquered by

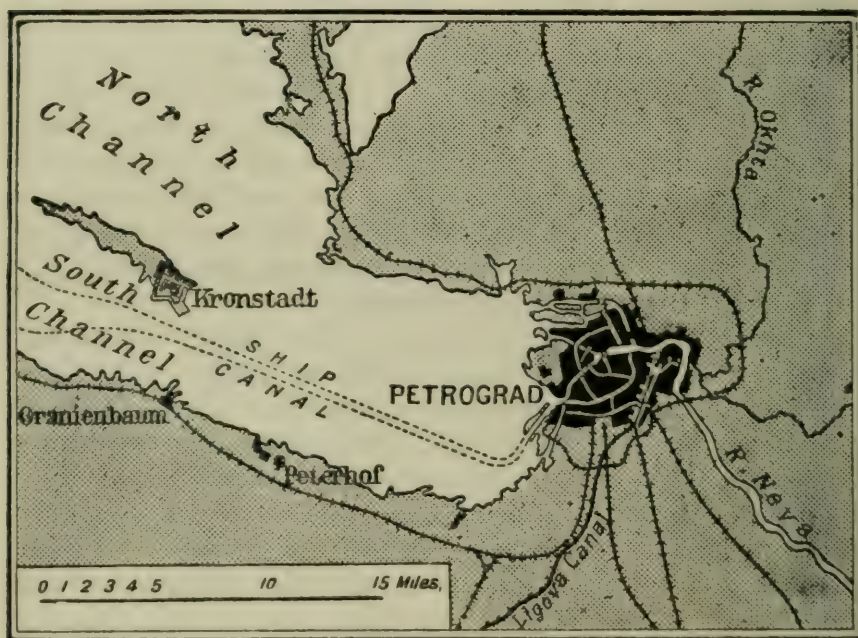


FIG. 53.—The Site of Petrograd.

Russia, and *Petrograd* was established in 1703 by Peter the Great near the site of the Swedish fortress of Landskrona in order to assure the conquests. He intended that it should bring Russia into closer contact with Western Europe. Petrograd is built at the mouth of the Neva at the head of the Gulf of Finland. It stands on both banks as well as on two large deltaic islands (see Fig. 53). On the seaward side the city is protected by the fortress of Kronstadt, built on an island at the entrance to the narrow upper end of the Gulf of Finland.



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FIG. 54.—Poland and the New Baltic States.

Petrograd is now the only "eye" through which Russia can look out on the Baltic Sea, for the following countries have been carved out of her former Baltic territories:—

Estonia (area 23,000 square miles; population $1\frac{3}{4}$ millions). This country lies south of the Gulf of Finland. Its capital is Reval, an important port. The Ests are of the same Asiatic racial stock as the Finns.

Latvia (area 25,000 square miles, approx. ; population $2\frac{1}{4}$ millions). This land lies south of Estonia and includes the coastlands of the Gulf of Riga. The majority of the people (78%) are Letts. *Riga* is the capital. This city is a very important port, and besides its extensive trade in all kinds of Baltic produce, it has important manufacturing industries, especially of linen and cotton goods.

Lithuania (area 36,500 square miles, approx. ; population 4–6 millions). This new country lies south of Latvia and is chiefly made up of the former Russian governments of Vilna, Kovno and Suvalki. Like its northern neighbours (Estonia and Latvia) it is a typical Baltic lowland. The provisional capital is Kovno. The ultimate ownership of the port of Memel is not yet settled. The Letts or Latvis of Latvia and the Lithuanians belong to the Northern race, *i. e.* they are of the same race as the north Germans and the Scandinavians. They belong to a different group, however.

Poland.—It is impossible to say exactly what the area and population of this restored country are as all its boundaries have not yet been fixed, whilst there are some parts where plebiscites have not yet been held. It is, however, a very large and important country which will act in the future as a "buffer state" between Russia and Germany. It comprises Russian Poland, the German provinces of West Prussia and Posen, and part of Galicia in the south. The new country is about the size of the British Isles, and its population numbers about 25 millions.

It contains within its borders valuable forests, extensive agricultural lands and rich mineral deposits (in-

cluding coal, iron, oil and salt). It has therefore every opportunity of developing into a strong State, if the Poles prove equal to the task. *Warsaw* occupies a splendid position for its function of administrative centre. It stands on high ground between the Baltic heights and the Carpathians, at an easy crossing-place of the Vistula, and is thus unaffected by floods. Its importance as a controlling point of east and west routes, and as the great western land gate to Russia, is seen in its predominance as the distributor to Russia of the goods and products of Western Europe. Its best outlet to the sea is by way of the Vistula to Danzig. For a time the old kingdom of Poland included this outlet within its frontiers, but although Poland has once more gained access to the sea (see Fig. 54), Danzig has not been restored, but Poland has freedom of access through that port. *Lodz*, noted for its cotton manufacturing, lies south-west of Warsaw. The raw cotton is imported via the Vistula. Both *Lodz* and *Warsaw* have important iron and machinery, leather and textile industries. *Cracow* and *Lemberg* are the chief Galician cities. *Cracow*, an old Polish capital, stands on the Vistula, where it passes through a gap between the Carpathians and the Polish Heights, so that it commands a great route along the Carpathian foothills. It is also not far from the important Moravian Gate. Near *Cracow* there are rich deposits of salt and petroleum. *Lemberg* stands on the watershed between Baltic and Black Sea streams, and commands important routes leading to Kiev and Odessa.

(2) *The North-Eastern Forests.*—In this part of the great forest belt the severity of the climate, the remoteness from the sea, and the lack of adequate means of communications have all conspired to retard development, except towards the south and the south-west, where extensive areas have been cleared of trees, and agricultural and other occupations are followed. The north-east is still in a state of almost virgin forest where trapping and hunting are the chief occupations, but where lumbering and forestry trades (including

the extraction of tar, pitch, resin, etc.), are becoming important.

Cultivated areas now extend as far north as the southern margin of the White Sea, but they are chiefly found in clearings in the south-western forests south of the 60th parallel of latitude. Rye, oats and root-crops are the chief cultivations.

Two coalfields are located in this region. The first, which lies south and south-west of Moscow, was the first Russian coalfield to be developed. *Moscow* has very important cotton, wool, leather and china industries, and is also the chief engineering centre in the country. The city, which is typically Russian and lies within the forest but towards its southern margin, grew up around a fortress—the nucleus of the famous Kremlin—built on a hill overlooking the Moskva, a tributary of the Oka. *Tula*, which lies south of Moscow, has large iron and steel works, and engages in the making of munitions and war materials.

The second coalfield lies on both sides of the Urals, in the district containing *Perm* and *Ekaterinburg*, the chief centres. Iron, gold, copper, platinum and precious stones are also found. Over 90 per cent. of the world's supply of platinum comes from the Urals. Perm, Ekaterinburg and other towns have growing iron and steel trades, and produce large quantities of railway stock, ordnance and agricultural implements.

Two other towns deserve special mention. *Nishni-Novgorod*, a twin city situated at the junction of the Oka and the Volga—Nishni on a prominence overlooking the river, Novgorod on the plains at its foot—is the old meeting-place of east and west. Before the building of railways much of the trade of Russia was transacted in great annual fairs held at convenient centres. Most of them are now only of local importance, but the great annual fair at Nishni-Novgorod, held from July to September, *i. e.* at a time when the harvests are either gathered or their content estimated, still retains some of its old importance. *Kazan*, built on rising ground a little distance from the Volga, so as to be above the

flood limit, stands at the southern margin of the forests. It was founded by Mongols, who, centuries ago, poured in great hordes from the Asiatic nomad-lands into the steppe of Russia. Kazan was one of their capitals, and its site was selected on account of its suitability for keeping the Russians of the forests in check.

(3) THE BLACK EARTH LANDS AND THE FERTILE STEPPES.

This region is the greatest agricultural region of Eastern Europe. The reasons for this are a suitable climate and a fertile, easily-worked soil. In the Black Earth lands both are ideal for wheat, the most valuable crop. Other cereals are rye, grown for home consumption—the wheat is largely exported—oats, barley and maize. Flax, hemp, beet and tobacco are also grown, the first three particularly in the west.

The cultivated area extends southwards beyond the margins of the Black Earth region to the fertile steppes; but towards the east and along the margins of the Black Sea the land becomes sandy and less fertile, and the rearing of horses, cattle and sheep takes the place of agriculture. Pastoral occupations are especially important in the country of the famous Cossacks, which lies between the Dnieper and the Don, and on the borders of the salt steppes.

Odessa is the great outlet for most of the products of the Black Earth lands. It stands on the Black Sea near the mouth of the Dniester. If it were at the mouth it would be more troubled with winter freezing than it is. *Nikolaiev*, on the Bug, and *Kherson*, on the Dnieper, are smaller ports. All three are engaged in flour-milling and in shipbuilding.

Kiev is the principal town in the interior, and the chief centre of the Ukraine, which may eventually form a separate country. Built upon high ground overlooking the Dnieper, it controls the routes along the Pripet and the Desna. It is a very ancient city, and was formerly the capital of the country; but its position, at the

southern edge of the forest, exposed it to the attacks of Mongol invaders, so that the capital was transferred to Moscow, which lies within the forest. It has important industries, including flour-milling, sugar-refining (beet), and tobacco and woollen manufacturing. *Saratov* and *Samara*, both on the Volga, are eastern Black Earth land centres. Both are important river ports and tobacco manufacturing centres.

This region contains the chief Russian coalfield. It lies in the valley of the Donetz, a tributary of the Don, and covers a larger area than all the British coalfields put together. All kinds of coal—anthracite, bituminous and lignite—are found, as well as an abundance of iron. It is evident that the future development of this rich coalfield will be a matter of great importance to Russia. Much coal is exported, especially by direct rail to Moscow and Petrograd, and to supply iron and steel trades springing up in towns between *Kharkov* and the Sea of Azov.

(4) THE SALT STEPPES AND DESERTS

This sterile region lies along the border of the Caspian Sea. A large part of it is actually below the level of the sea and once formed part of that great inland lake or sea. In these areas there are extensive salt marshes. The rest is usually sandy. Near the Caspian Sea true desert occurs, but towards the Black Earth lands there are sufficient patches of grass to support nomadic pastoral tribes like the Kalmucks of the lower Volga, and the Kirghiz of the Ural river. This is one of the very few parts of Europe where camels are used for transport. They are frequently seen in the streets of *Orenburg*, on the Ural river, to which town animals, wool, skins and leather are taken for sale or exchange. The most important town in the region is *Astrakhan* at the mouth of the Volga. It engages in the Volga and Caspian sturgeon fishing, and in the preparation of isinglass and caviare. It has also an extensive trade in wool and tallow, and distributes by

rail to different parts of the interior the petroleum brought by steamer from Baku, and the cotton brought by rail from Turkestan and central Asia to Krasnovodsk, and from thence by steamer across the Caspian Sea. It is, of course, hampered by the fact that the Caspian Sea has no outlet to the open sea, and also by the freezing of its harbour for about three months every year.

(5) THE MEDITERRANEAN LANDS.

The lands included under this heading are, of course, those which have the Mediterranean type of climate. They are found in the southern Crimea. The flat northern part of the Crimea belongs to the steppe, but the south comes within the region of winter rains and summer drought. It is crossed by mountains which form a link between the Balkans and the Caucasus. The southern slopes to the Black Sea, often called the Crimean Riviera, produce vines and other Mediterranean products. *Sevastopol*, at the western end of the mountains, is the Russian Black Sea naval depôt.

CHIEF COMMUNICATIONS.

Water Communications.—Keeping in mind the relief of eastern Europe, we may expect to find that most of the rivers are slow flowing and therefore help transport. But recalling the climate, we should immediately suspect that many of them will suffer from winter freezing and from a shortage of water at certain seasons, whilst at others they will probably be in flood. The very length of many of the rivers is really a drawback, since river transport is slow (*e.g.* Volga steamers make fourteen miles per hour with the current, and about eleven against it), and goods from the interior take a long time to get to the ports.

The Volga, the chief Russian river and the longest in Europe, rises at a height of about 1,000 feet in the Valdai Hills, the chief watershed, and flows for some 2,300

miles to its mouth in the enclosed Caspian Sea. A map of the Volga looks like a tree whose lower branches have been lopped off. Most of its tributaries come from the clay-covered forest belt, where the supply of water is more regular and greater than in the dry steppe belt to the south. No important tributary is received below the confluence of the Kama. At Samara the river makes a great bend where it passes round a high range of hills. Finally, it splits into several channels, and enters the Caspian Sea by a great delta.

Canals have been built in order to supplement the river systems, and to give through water transport from the Baltic Sea to the Caspian and Black Seas. Three canals join the basin of the Neva to the Volga basin, whilst the western Dwina, the Niemen and the Vistula are all connected with the Dnieper.

Roads have been constructed in all parts of the country, but many of them are impassable during the thaws of spring, with the result that villages comparatively near to large towns are quite cut off for a time. In winter, when the whole country is in the grip of frost conditions, the sledge forms a useful means of transport.

Railways.—The great land entrances to the plains of eastern Europe are: (i) around the northern end of the Gulf of Bothnia, (ii) along the northern plain of Germany or through the Moravian Gate to the key town of Warsaw, (iii) along the Roumanian lowland, (iv) around the eastern end of the Caucasus, (v) across the Kirghiz steppe between the Urals and the Caspian. All these routes are followed by railways. In addition to the routes mentioned, the heart of the plain can be approached by railways from ports on the four great seas washing its shores. Thus, from north, south, east and west, railways strike inland, and most of them by direct routes, like the spokes of a wheel, converge upon *Moscow*, the hub of the Russian railway system.

The latest railway is destined to be of great importance. Constructed under war conditions, and largely by the labour of prisoners of war, it connects Petrograd with *Alexandrovsk*, a practically ice-free port in the

north of the Kola peninsula, at the mouth of the Tuloma river. Even so far round North Cape the effect of the warm North Atlantic Drift is felt.

THE PEOPLES AND THEIR PROBLEMS.

Whoever would understand Russia must first realize that the traditions and ideals dearest to the peasants who form the bulk of the population have come down from the past. It is believed that long ago peoples inhabiting the highlands of Central Europe left their mountain homes and penetrated the great forests stretching across Russia north of the Black Earth Lands. These early peoples established their homes in clearings and developed scattered village communities, each of which was separate and self-sufficing, communal in ideals, and strongly opposed to any private ownership of land. Such a village organization came later to be known as the *Mir*, a name which is significant, for it means "the world."

The forest communities were organized by the ninth-century Northman, Ruric the Jute, who established an aristocratic military dynasty which lasted until the early seventeenth century. Russian conquest gradually spread from the forest until the whole of the vast territories which formed the Russian Empire in 1914 were under one central government. But geographical conditions have asserted themselves, so that the Slavs of Poland and of Muscovy, cut off from each other by the great Pripet and Lithuanian marshes have developed on somewhat different lines. The Poles, influenced from Rome, became an eastern outpost of the west, whilst the Slavs of the Upper Volga basin received their ideals from Byzantium via Kiev and the Black Sea. The people of the Black Earth Region, the Ukraine, also belong to the Greek Church; but their greater exposure to attack from steppe nomads caused them to develop a strong military organization. Then in the steppes of the Don we have the Cossacks, who from 1654, when they gave their allegiance to the Russian

Czar, to the Revolution in 1917, have formed the great buttress of Russia towards the south-east.

All these peoples have one thing in common, and that is the communal ideal which is an heritage of the forest. Even the Cossacks have soldier communes under an aristocratic leader with a strong bond of brotherhood between leader and men. It is very interesting to notice that the modern industrial movement in Russia is largely a village development, but that in both village and town the workers bind themselves together in associations known as *artels*, in which the community spirit is very strong. Now we in Western Europe may not choose the mir and the artel for ourselves, but we shall not understand Russian problems unless we realize that to the Russian peoples themselves these ideals are very dear, because they have their roots far in the past. Nor must we be too hasty to judge because what appears to be a travesty of these ideals holds sway for the moment.

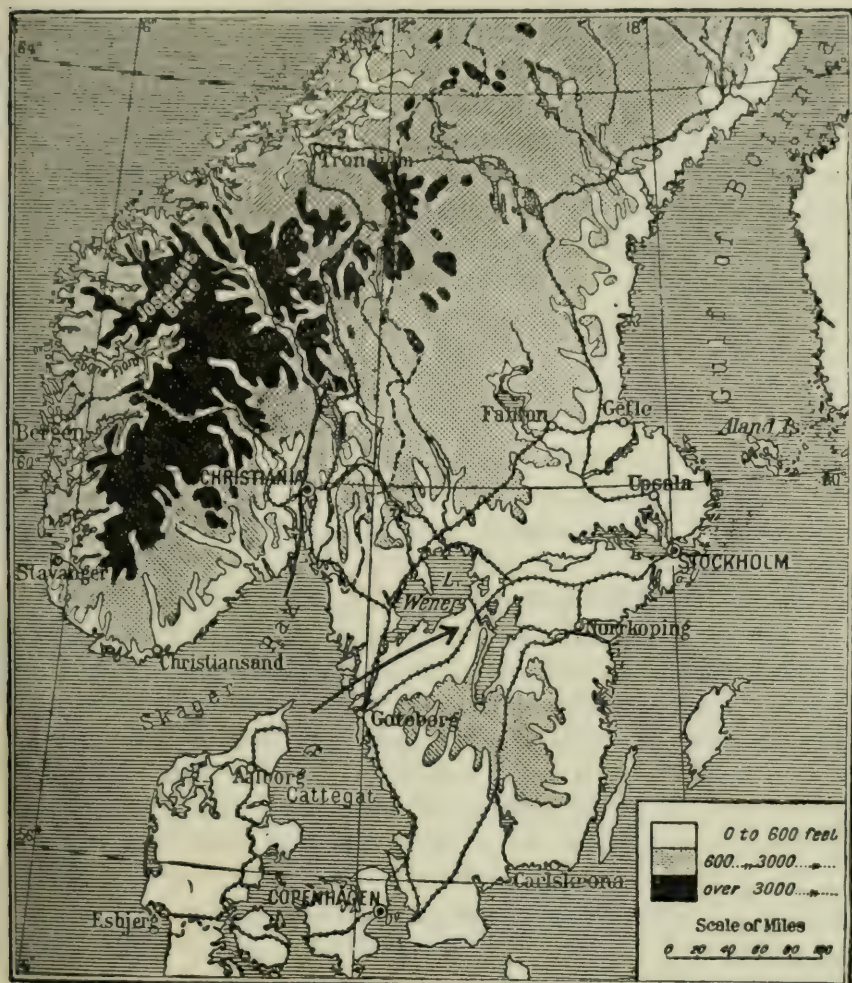
THE SCANDINAVIAN PENINSULA.

The Scandinavian Peninsula contains two countries, Norway and Sweden. From 1814 to 1905 both were under one political control, but it will be seen from our study of the geography of the land that the peninsula contains two environments with different geographical conditions. These differences have asserted themselves in the realm of political geography.

PHYSICAL FEATURES.

The Peninsula consists in the main of an ancient plateau so tilted that throughout its length, from the Naze in the south to North Cape in the north, it descends very rapidly to the Atlantic Ocean, whilst to the east it descends to the Baltic in a series of plateau steps. The highest crest is, therefore, close to the west coast and is known by various names. In the north it is called

the Kiølen Mountains, since from the sea its long, even crest reminded the fishermen of the keel of an upturned boat. In the south, where the plateau is highest and most extensive, there are many "fields" or "fjelds,"



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FIG. 55.—Southern Scandinavia.

mountain ridges rising above the general level of the plateau, of which the Dovre Field and the Hardanger Field are the chief. Notice also the Jostedals Brae, an extensive permanent snow-field (see Fig. 55). Only in the south of Sweden are young rocks found, and

these are largely covered by sheets of glacial materials which also cover parts of the coastal lowlands, as well as the depression extending from Göteborg to Stockholm, a depression which was once a strait.

In Norway the coast is extraordinarily bold, rugged and deeply indented. Its characteristic features are the fiords and the "skerry-guard" or "fence" of islands. The *fiords* are former river valleys, scooped out and deepened by glaciation, and sunken so as to admit the sea. The calm waters between the islands and the coast and within the fiords were the nurseries and training grounds of the Vikings of old, and in modern times of the sailors and fishermen for whom Norway is noted. The word Viking means "a frequenter of viks" (bays and fiords), or, rendered freely, "the man of the calm water." The coast of Sweden, too, is usually rugged, and it has its island fringe, but both the coasts and the islands are low, and generally sufficiently fertile to be wooded, whilst those of Norway are high and barren and almost force man to find his means of livelihood on the sea.

The Norwegian rivers are short, owing to the nearness of the watershed to the sea, exceedingly swift, and frequently reach the sea by a great leap from the towering heights overlooking the fiords. Fortunately, however, Norway has the Glommen, without whose valley she would indeed be a poor country. The longer Swedish rivers are of great value for their flotability, and they are employed in transporting timber from the forests to the coasts. In both countries the rivers are of great value as sources of power, but of little value for navigation.

CLIMATE.

Neglecting for the moment the tundra for it supports so few people as to be relatively unimportant, the essential characteristics of the climates of Norway and Sweden are illustrated by the following figures—

Towns.	Mean January Temperature.	Mean July Temperature.	Mean Annual Rainfall in inches.
Bergen	34° F.	58° F.	68
Stockholm	27.	62	16
Tromsö	27° F.	52° F.	41
Lulea	13	59	19

These figures indicate that Norway has a more equable distribution of temperature than Sweden, where a more extreme type of climate is experienced. The rainfall of Norway is also greater than that of Sweden which lies in the *rain shadow* of the higher Norway. In both countries temperature falls with increase in latitude, but to a more marked degree in Sweden during winter-time. In Norway the coast is ice-free even to the extreme north, but in Sweden the Gulf of Bothnia freezes every winter, sometimes from side to side so that it can be crossed by sledges, whilst the Sound and the other Baltic entrances are sometimes closed owing to their being blocked by drifting masses of ice, but they are only very rarely themselves frozen. Most of the Swedish rivers and canals are frozen for various periods in winter.

CHIEF OCCUPATIONS.

The physical and climatic contrasts between the two Scandinavian countries result in marked differences between their leading occupations.

Fishing.—Norway is the more important country in this respect, not only on account of its coastline, but also because it is in contact with the open sea, and particularly with the great fishing ground of the continental shelf and the Arctic fishing of northern seas. Sweden opens to an inland sea, which has the disadvantages of being very brackish and cold. The Norwegian fishing centres are Bergen and the Lofoten Islands. Salmon are caught in the fiords and rivers.

Shipping and Shipbuilding.—Since these are closely

related to fishing and contact with the sea, it follows that Norway leads in this respect too. She is, indeed, one of the leading shipowning countries in the world, and is particularly well favoured for the building of wooden ships.

Forestry Occupations.—Here Sweden leads, for she has much more extensive and more valuable forests than her neighbour, whose land is more barren owing to its elevation. Except for the northern tundra and its extension southwards along the high plateau, the whole peninsula lies within the belt of cool temperate forests. In the south deciduous and mixed deciduous and coniferous forests prevail, but elsewhere the forests are of pine, fir, larch and spruce.

Closely allied to the lumbering trade are such industries as match-making and the making of wood-pulp and paper. These industries flourish in many places, electrical power being supplied by the numerous waterfalls. The modern tendency is not to export "raw" timber and wood-pulp, but to make the timber up into furniture, door- and window-frames, etc., and to convert the pulp into paper *before* exportation.

Agriculture.—Sweden has great advantages over Norway in respect of agriculture. As should be expected, the cultivated areas of Sweden are largely in the south, and in Norway in the Glommen valley. The chief cultivations are oats—easily the chief—barley, rye and root-crops, particularly potatoes. Pastoral occupations are important in both countries. In southern Sweden dairy-farming is the leading industry, and considerable quantities of butter and other dairy products are exported, especially to England. Norway, having poorer hill pastures, has twice as many sheep and goats as Sweden.

Mining.—Scandinavia is exceedingly rich in minerals, and especially in high-grade iron ore, and in this respect Sweden leads. The mining centres are in the district of *Dannemora*, north of Stockholm, and in the district of *Gellivara* in Norrland. The latter, which produces over half of the total, has the disadvantage

of having as its Swedish outlet a port, Lulea, which is ice-bound for the whole of the winter. Therefore a railway has been built to the ice-free Norwegian port *Narvik*, on Ofoten Fiord. Owing to the almost complete absence of coal, most of the iron ore is exported, for it would be an unwise use of timber to employ it in smelting, and it is not so economical to bring coal to iron as to take iron to coal. Copper (mined at Fahlun and exported from Gefle), silver, zinc and sulphur pyrites (valuable in paper manufacturing) are also mined.

The mineral wealth of Norway is also considerable, and is being developed. All the ores of Sweden are found, but the iron is of lower grade.

Manufacturing.—The leading manufacturing industries are connected with the timber and wood-pulp industries. With the development of their water-power, both countries will undoubtedly increase their manufactures. Norway, with an ice-free ocean, magnificent harbours and a suitable climate, may become an important cotton manufacturing country, whilst Sweden may develop her iron trades. She already engages in engineering, woollen and cotton trades at Norrköping, and in cotton manufacturing at Göteborg. There would also appear to be a wide field for the application of electricity to problems of transport, which are difficult in such a mountainous region as Scandinavia.

CHIEF CITIES AND ROUTES.

Some of the most important Scandinavian cities lie at the seaward ends of two great depressions, one crossing Norway, the other Sweden. The Norwegian north and south depression offers the easiest line of movement from Christiania Fiord to Trondhjem Fiord, and is controlled at its southern end by Christiania, and at its northern end by Trondhjem. *Christiania*, the capital of Norway, and the only large city in the country, stands at the head of the pine-clad fiord of the same name. It is at the southern gate to the richest and most fertile part of the country, viz the Glommen

valley. *Trondhjem*, the ancient ecclesiastical capital of Norway, is an important fishing and tourist centre. *Bergen* is closely related to Christiania and Trondhjem, for it was selected by the Hansa merchants as a half-way house on the sea-route between the two. It lies on the coast, about half-way between the great Sogne and Hardanger Fiords, and is protected by the skerry-guard of islands. It is the chief Norwegian fishing centre, and exports large quantities of fish to the Roman Catholic countries of Southern Europe.

The Swedish depression runs east and west, from the Skager Rack to the Baltic, and has at its seaward "gates" Göteborg and Stockholm. Water communication between the two towns is maintained by the Göta Canal, which connects Göteborg to Lake Wener, that lake to Lake Wetter, and the latter to the sea via Norrköping. The rest of the passage is by sea. *Stockholm*, a beautiful city of pine-woods, islands, bridges and lakes, is built at the entrance to Lake Mälär. It rose to great importance in the middle ages, when Sweden possessed Finland and part of the south coast of the Baltic, for it is centrally placed on a sea which in those days had a greater relative importance than it has to-day. It is becoming a manufacturing town, owing to the development of the mineral resources of neighbouring districts. *Göteborg*, at the western gate of the depression, is a very important outlet for forest and dairy produce.

Other Norwegian towns are *Stavanger*, a shipping centre south of Bergen, and *Tromsö* and *Hammerfest*, both northern fishing centres. In Sweden, *Malmö*, a very important port and packet-station standing on the Sound opposite Copenhagen, and *Carlskröna*, the naval station, should be carefully noted.

DENMARK.

Physically, historically, racially and politically Denmark is very closely related to Scandinavia, especially

to southern Scandinavia. It is the road along which in early times invaders passed and flowed over to the conquest of Scandinavia, using the two depressions described above (see p. 185). At one time the whole region (Scandinavia and Denmark) was under Danish rule, but first Sweden, and later Norway, broke away. In former times the Baltic Sea was of greater world importance than to-day, and Denmark, the controller of its entrances, was a very important country with many colonies.

PHYSICAL FEATURES AND CLIMATE.

Physically, Denmark is a continuation of the North German Plain, which it resembles in being strewn with glacial deposits of sand and clay. It has, therefore, also a close resemblance to the undulating lowlands of southern Sweden. Along the west coast there is a belt of sand dunes and beaches, whilst along both west and east margins the chalk measures, which underlie the country, appear at the surface and aid in giving diversity. The island of Bornholm deserves special mention, for, unlike the rest of Denmark, it consists of ancient rocks and has high granite cliffs. It is a detached portion of the Scandinavian massif.

The climate of Denmark is really a transition type between that of Britain and that of Central Europe. The mean January temperature is about freezing point and the July temperature thirty degrees higher. The rainfall is very evenly distributed—the sand dunes on the west coast receive most—and amounts to an annual average of about 25 inches.

OCCUPATIONS.

Nature has not richly endowed this small country. She possesses no coalfield, no metals, little building stone, no important river, and, owing to the lowness of the country, no water-power, whilst her soil is at best

only poor, and considerable areas are practically useless. But by dint of intelligence, perseverance and enterprise, qualities ingrained in former generations of Danes by their great maritime exploits, and never lost by their descendants, the people of Denmark have in recent years built up industries that are at once the model and the envy of many larger countries.

Agriculture.—The rather severe climate, and especially the almost constant high humidity of the air, together with the sterility of much of the soil, combine to make pastoral occupations of greater importance than agriculture. The soil has been enriched by artificial manures, and, by careful tillage, large crops of oats, barley, rye, beetroots, potatoes and fodder plants are grown. But cereals are grown in insufficient amounts to supply the nation's needs, and have to be imported. This is particularly the case with wheat, of which very little can be home grown.

Dairy-Farming.—It is for her dairy-farming that Denmark is chiefly noted. During the last forty years enormous progress has been made. The number of cattle and pigs has greatly increased, and with it the production of butter, cheese and bacon. It must be recalled that this increase has taken place despite the loss of the southern provinces (now partly regained) and the cutting of the Kiel Canal. But the most remarkable features have been the improved quality of the animals themselves, the marked increase in the milk yield per dairy cow per year, and the maintenance of a very high standard of quality in all forms of dairy produce. These results have been largely brought about by the application of science to dairy-farming, and by the development of co-operative farming and sound schemes of technical education. Horses and sheep are also reared.

Fishing.—The west coast of Denmark is very poor and has no good harbours, but its shallow waters are good plaice-fishing grounds. The quiet waters of Liim Fiord, made as recently as 1825 by a great inundation of the sea, is a noted "nursery" for young plaice from

the North Sea. *Esbjerg*, the best harbour of the west coast, is the chief fishing centre.

Manufacturing.—The lack of minerals, except the china clay of Bornholm, which is made into porcelain at Copenhagen, limits manufacturing either to articles in connection with agricultural and pastoral pursuits, or to the building of ships. Agricultural implements, sugar (from the beet) and margarine are growing manufactures. Shipbuilding is carried on at the ports.

CHIEF CITIES AND ROUTES.

Two important sets of routes are controlled by Denmark: the sea routes to the Baltic and the ferry-train route from *Esbjerg* to Stockholm. Of the sea entrances to the Baltic the Sound is by far the most important, for despite the drawback that it is shallow, it offers a more direct route than the Great Belt, whose advantage of greater depth is annulled by dangerous currents and sandbanks. The Little Belt is of comparatively small importance as a highway into the Baltic. *Copenhagen* (= The Merchant's Haven), the capital of Denmark, commands the Sound. It has a population of about half a million, which is not quite one-fifth of the total population of the country. The city is built on a narrow strait between Zealand and the small island of Amager which gives it a protected harbour, the best in the country. Its command of the Sound has made it a great collecting and distributing centre for the produce of the Baltic region, and particularly for Swedish and Russian dairy produce.

The second great route of Denmark also passes through Copenhagen. The construction of the Kiel Canal was a great blow to Denmark, both strategically and commercially. To meet the new competitor the Danes have developed a means of quick transport, without break of bulk, from the west Jutland port of *Esbjerg*, to Malmö and Stockholm in Sweden. This is accomplished by means of railway trains and ferry boats, the latter being

used to transport the trains across the two Belts and the Sound (see Fig. 56).

Aalborg, on Liim Fiord and *Aarhuus*, on the east



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FIG. 56.—Denmark.

coast of Jutland, are small ports engaged in cattle and grain trade.

The Farøe Islands (= Sheep Islands), an isolated group of volcanic islands lying midway between the Shetlands and Iceland, support about 18,000 people, whose occupations resemble those of the Orkney and

Shetland Islands—*i. e.* sheep-rearing, fishing, etc. They belong to Denmark.

ICELAND.

Iceland, whose area is equal to that of Ireland and Wales combined, is a very mountainous island. Its elevation, combined with its high latitude, results in the greater part being covered with snow-fields and glaciers. The only inhabited areas are small lowlands in the south and south-west. These have been built up of glacial débris brought down by rivers. Elsewhere the coasts are high, and in their deeply indented character resemble the coasts of Norway. The island is largely built of basalt, which suggests volcanic activity, past or present. There are scores of volcanoes, active or extinct, and numerous geysers or hot springs. Mount Heckla is the best known volcano in the island.

The 85,000 inhabitants live on the south and south-western lowlands, where there are rich pastures in the short summers. Cattle, sheep and ponies are reared. Fishing is also carried on. *Reykjavik*, on the south-west coast, is the capital and centre of the legislature, for Iceland now possesses a separate constitution and enjoys home rule.

HOLLAND.

PHYSICAL FEATURES.

Holland, or the Netherlands (*i. e.* the hollow or the low lands) is larger than Belgium, but has a smaller population. Like Belgium it is a buffer state, or rather, with Belgium it makes a combined buffer between the north German plain and northern France. Physically it is largely the combined delta of the Rhine, Meuse and Scheldt, and that is why so much of the country is very flat. Fig. 57 shows that about one-fourth of the country is actually below the level of the sea, whilst as large a proportion as three-fifths is less than 16 feet

above sea-level. The low-lying lands are protected from the sea by natural sand-dunes or artificially constructed *dykes*, which are found along the whole length of the coastline. Dykes have also to be built to contain the rivers, which would otherwise flood the low land. The Frisian Islands mark a former coastline, which was

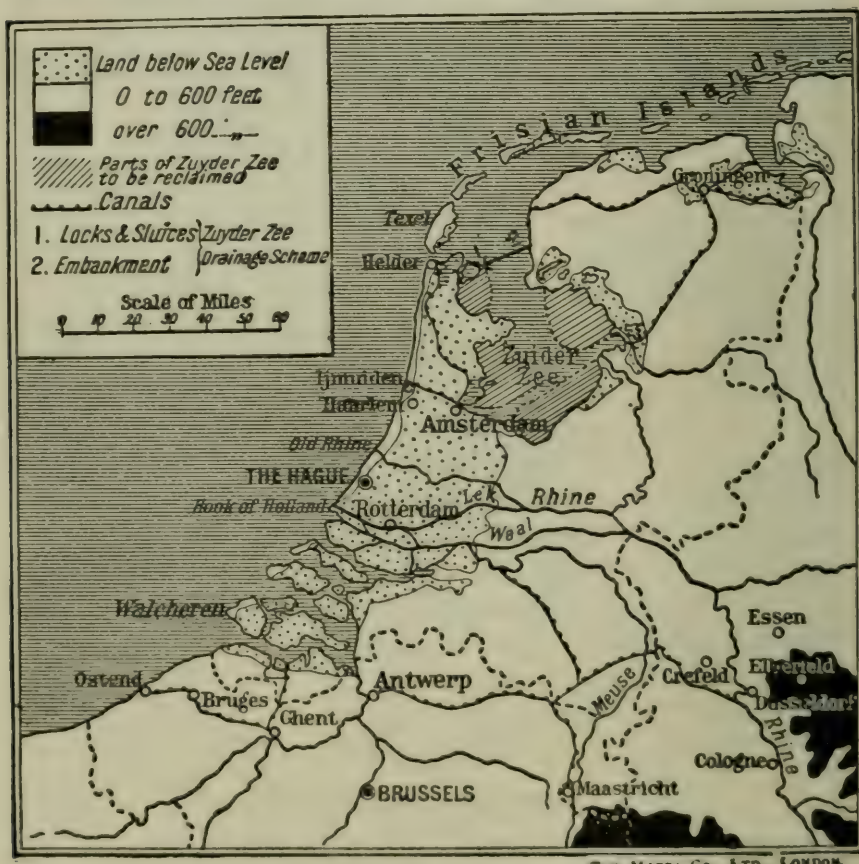


FIG. 57.—Holland.

breached by the fourteenth-century inundations which led to the formation of the Dollart Zee and the Zuider Zee (= South Sea). Much of the low-lying land of Holland has been reclaimed from the sea by the work of man, and ambitious schemes for the reclamation of part of the Zuider Zee have recently been approved by the Dutch States-General, or Parliament. The name

polder is given to the land thus won from the sea. The task should not be insuperable, since large areas of the Zuider Zee are very shallow. A total area of 815 square miles is to be reclaimed, leaving in the centre a fresh-water lake with access to Amsterdam. It is expected that some 250,000 people will find ample support on the new lands (see Fig. 57).

Eastern Holland is higher than the western half of the country. In the north-east, in the district south of Groningen, there are hills of gravel and sand rising to heights of from two to three hundred feet. South and south-east of the Zuider Zee, except for the clay belts along the Lek, Waal, Meuse and Ijssel, sandy lands extend into Germany on the one hand and into Belgium on the other. The sandy region adjoining Belgium is part of the Campine. In the extreme south-east where the frontier makes a peculiar extension between Liège and Aachen, the land attains an elevation exceeding 1,000 feet. This extension reaches the carboniferous belt and contains some coalmines.

CLIMATE.

The climate of Holland may be compared with that of Denmark. The summer temperatures are slightly higher than in eastern England, and the winters are several degrees colder, so that, for example, skating on the frozen rivers, lakes or canals is more common in Holland than in England. The rainfall is very evenly distributed owing to the flatness of the country, and varies from 20 to 30 ins., being highest along the coastal dyke and dune belt. The winds, whether the prevailing westerlies or the frequent cold east winds of winter, blow across Holland with remarkable steadiness, a factor which greatly facilitates the drainage of the polders by means of windmills. The typical scene in western Holland comprises flat land, straight roads and field boundaries, canals, windmills and cattle.

CHIEF OCCUPATIONS.

Holland is essentially an agricultural and pastoral country, for except in the small south-east portions, where about 1,500,000 tons of coal per annum are mined, and in districts where clay suitable for the manufacture of pottery is found, there are practically no minerals or even building stone. This is a great disadvantage, for it means that large quantities of road and dyke making materials have to be imported at very considerable expense. Timber has to be imported, too, for only one-thirtieth of the surface is forest clothed.

There are considerable differences between the farming occupations of western and eastern Holland, differences which are due to the fact that in the west the soils are largely alluvial and heavy, and have been reclaimed from the sea, whilst in the east the prevailing soils are light and sandy. In the west only the surface soil can be properly drained, but in the higher east the drainage difficulty does not occur. Therefore in western Holland dairy-farming (including, of course, the production of butter and cheese), the rearing of horses, especially of dray-horses, and the cultivation of flax, tobacco, flowers, and root-crops form the chief occupations. In eastern Holland sheep are more important than cattle, and rye, oats, wheat, beets and potatoes are the chief products wherever the soil is suitable for cultivation. The chief centre for bulbs and flowers is Haarlem, where both sandy and clay soils are found, and the horticultural industry is carried on on land which was once the bed of the Haarlem Lake.

The manufactures of Holland are either related to the agricultural products or based on articles imported from the Dutch colonies. Thus the cultivation of flax is associated with the manufacture at Haarlem and other centres of the cloth known as *brown holland*, and with the making of linen goods at Tilburg in South Holland. Hollands gin is distilled from rye at Rotterdam; in several towns in Zeeland and North Brabant there are factories for the manufacture of beet sugar, whilst in Amsterdam

and other towns tobacco is manufactured, but in this case most of the raw material is imported from the colonies. The chief Dutch colonies are in the East Indies, and Amsterdam and Rotterdam are the great markets for their products, which include cinchona, cacao, tobacco, cane sugar and molasses. Based upon these Colonial imports, quinine, chocolate, tobacco, sugar and distilling industries have sprung up and find employment for large numbers of people. At Delft and The Hague pottery industries have developed owing to the suitability of the local clay. Amsterdam is the chief European centre of the diamond-cutting industry, an industry which shows a link with the former Dutch interests in South Africa. Some cotton and woollen manufacturing is carried on at places like Amsterdam and Utrecht, but comparatively few people are employed, for, except at Maastricht in the south-east, where woollen manufacturing is engaged in, there are few natural advantages which favour textile industries.

Fishing is a very important industry in Holland, and had a great deal to do with the training of those sailors who laid the foundation of Dutch Colonial greatness and foreign trade.

MEANS OF COMMUNICATION.

One of the most important points in connection with the communications of Holland is its position with regard to Germany, and particularly to the Westphalian industrial region. The leading imports of Holland are cereals and flour iron ore, iron and steel goods, textiles and copper. These are also the chief exports. From what we have learned of the natural resources of the country it is obvious that these articles indicate a large transit trade.

The principal railways of Holland are those which place the Dutch ports into communication with German cities. *Hook of Holland* is a packet station, from which an important line runs via Rotterdam and Hanover to Berlin. The route London-Harwich-Hook of Holland-

Rotterdam—Berlin gives the shortest journey between London and Berlin. Lines from the Hague—the seat of government—and Amsterdam join this route before it reaches the Dutch frontier. *Flushing*, on the island of Walcheren, is another important packet station with English connections.

In addition to the Rhine, which is the chief waterway, and to the navigable estuary of the Scheldt, there are canals deserving of special mention. *Rotterdam*, the chief Dutch port, is reached by large steamers, not by means of the Lek on which it stands, but by a canal, the New Waterway. *Amsterdam*, the largest city in Holland, stands on the Zuider Zee, in a less favourable position for a modern port than Rotterdam. It is reached by two canals: the North Sea Canal cut across the base of the North Holland peninsula from the fishing port of *Ijmuiden*, and the North Holland Canal which follows the length of the peninsula from Helder.

THE PEOPLE OF HOLLAND.

The majority of the inhabitants belong to the tall, fair-haired Northern Race. People who show characteristics of the shorter, darker Alpine Race are found in those parts of the country which were formerly most inaccessible, *i. e.* the islands and marshy districts at the mouth of the Rhine. Long ago their ancestors probably took refuge there. In Holland we have a very good example of the marked influence which environment has on the character of the people. The inhabitants of the Frisian and Zeeland Islands, and particularly those of the former, being by nature good fishermen, later became famous as seamen and founders of colonies, and took the largest share in the building up of Dutch sea-power. The Dutchman of the polders got his sturdiness, grimness, perseverance and obstinacy, in the long fight against the encroachments of the sea, and in the long and difficult task of reclamation. The East Hollander, who lives farthest from the sea, and comes in contact with it least, has felt its influence least.

The Era of Discovery, with its finding of new routes to the Far East, and its discovery of America, found the maritime countries of Western Europe excellently situated for participation in the race for commercial and colonial supremacy. We must not forget the important part taken by Holland. Her sailors went to all parts of the known world, and took no small part in the exploration of new countries. The Spanish ports were closed to them, but colonies were acquired in the West Indies, the East Indies, in South America, in South Africa, and in Ceylon, whilst Dutch sailors were the earliest explorers of the coast of West Australia, of Tasmania and of New Zealand. Even the present Dutch Empire, which is chiefly in the East Indies, has an area over sixty times as large as the homeland, whilst of the 45,000,000 subjects of the Queen of Holland, only one-seventh live in Holland. Holland's great disadvantage is the lack of minerals. It is largely this which has compelled her to take a lower position in the modern world than she had in the days before coal and iron became of such prime importance.

BELGIUM.

GENERAL FEATURES.

Belgium is essentially a buffer state, and to this fact it owes its independence. Geographically the little country, whose total area is about twice that of Yorkshire, is also a transition state. Its chief rivers, the Scheldt and the Meuse, rise in France and have their mouths in Holland; its surface, whether plains or highlands, is an extension of the features of adjoining countries; its coal and iron fields extend into France on the one hand and into Germany on the other, whilst its frontiers are so poor as to give inadequate natural means of defence. The history of the country is largely the history of other countries, for the land has been at different times in the possession of the French, the Dutch, the Spaniards, or the Austrians, whilst its

position, just where the central plain of Europe is narrowest, and on either side broadens out to the French and German lowlands, has made it the "Cockpit of Europe."

On physical grounds Belgium can be divided into three distinct regions: (1) the Coastal Belt; (2) the Central Plains; (3) the South-Eastern Highlands.

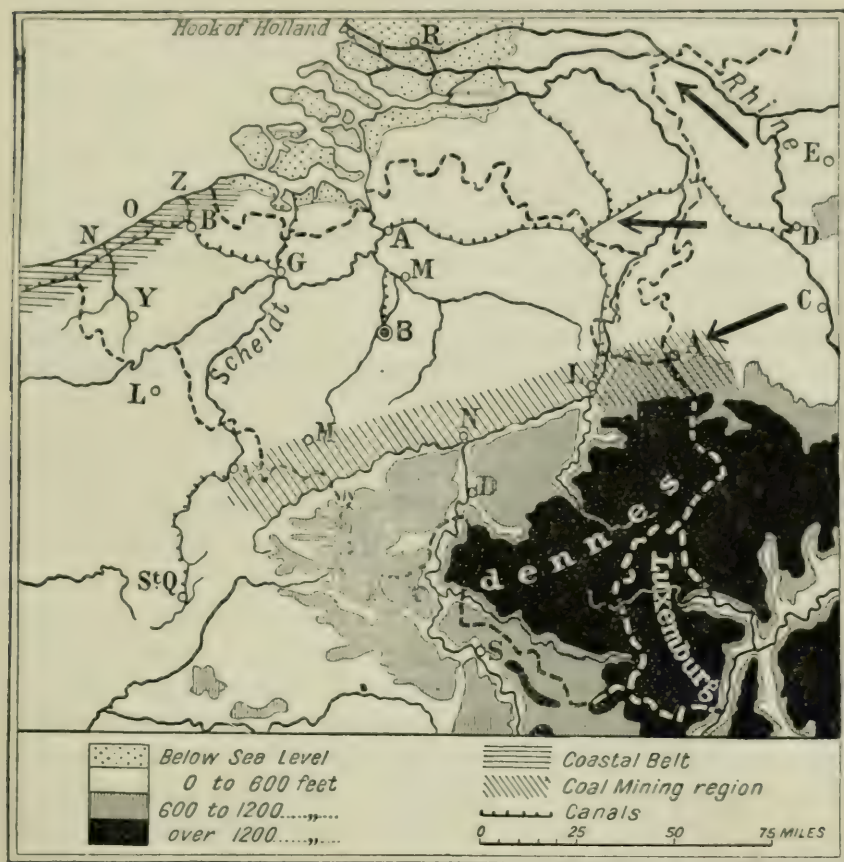
(1) THE COASTAL BELT.

Off the Belgian and Dutch coasts there exists a quiet pocket of water where the rise and fall of the tide are not very high. Here much of the débris swept along the coast by the tides or brought seawards by the rivers, collects to form new land. The extent of the gain may be seen when it is recalled that cities like Ypres and Bruges were ports on navigable waterways in the middle ages when they were at the height of their power, but silting has caused them to be "dead" cities. The coast itself is very poor, and contains no good natural harbours, but its large expanses of sand and the shallowness of the sea have led to the growth of many popular bathing resorts. Along the coast are lines of sand-dunes, strengthened, where necessary, by artificial embankments in order to prevent the sea from invading the lowlands behind. In order that these flat lowlands may be drained there are gaps in the system of dunes and embankments. *Nieuport* (= the new port—Ypres is the old port) stands where the Yser enters the sea at the western gap. *Ostend* stands at the east end of the central gap, and *Zeebrügge*, the new port of Bruges, in the eastern gap. *Zeebrügge* harbour, protected by its famous Mole, is reached by a dredged channel to the open sea.

The poor drainage of the coastal belt makes the land of little value for agriculture, but cattle-rearing and dairy-farming flourish and form the chief occupations, except in the parts where fishing is engaged in.

(2) THE CENTRAL PLAINS.

The rich loam-lands of central Belgium constitute the chief agricultural areas of the country. They are in marked contrast to the sterile Campine land, although even there much has recently been accomplished by



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FIG. 58.—Belgium.

the mixing of the sand with the clay which lies below, and by the addition of artificial or other manures. The chief products, rye, oats, wheat, beet and flax, resemble those of north-eastern France. Oats are largely used in the rearing of horses, for which the district between Ostend and Brussels is particularly noted, whilst beet

and flax provide the materials for sugar and linen manufacturing. Intensive methods of agriculture are practised, this being aided by the fact that the bulk of the people are small holders. The spade is the chief implement used, so that the method is really gardening on a large scale.

Antwerp, the chief commercial centre and port of Belgium, lies on the tidal estuary of the Scheldt. The natural waterways have been supplemented by railways and canals in such a manner that the whole system gravitates towards the mouth of the Scheldt. This river is connected by canals to the Meuse and the Rhine, and this, together with the railway connections, gives Antwerp a great transit trade, especially for goods being exported from, or imported to, Germany. Coal has been discovered in the Campine area. Should the deposits prove to be rich and not too difficult to obtain, their development will necessarily increase the importance of Antwerp.

Ghent, at the confluence of the Scheldt and the Lys, and at the tidal limit of the Scheldt, can also be reached by canals from Ostend and Zeebrügge, which converge upon *Bruges*, and by a canal from the estuary of the Scheldt. The ease with which Ghent can import raw cotton via this canal has led to its becoming the chief cotton-manufacturing centre. It also makes linen goods. Its great disadvantage is the absence of coal in the immediate locality. In the upper Scheldt basin linen manufacturing has naturally grown up in the chief flax-producing region. *Courtrai* and *Tournai* are engaged in this industry. Lace-making is carried on in Malines, and also in Brussels, which also manufactures carpets.

(3) THE SOUTH-EASTERN HIGHLANDS.

The Ardennes plateau consists of very old rocks, and is of small economic value, owing to the sterility of the soil and the severity of the climate. Considerable areas are covered by valuable forests, while efforts have been made to afforest some of the areas which have been

cleared of trees in days gone by. The carboniferous belt lying along its north-western margins contains the coal deposits which have made Belgium a busy manufacturing country, and have given it a greater density of population per square mile than any other European country. In both of these regions agriculture is chiefly confined to the valleys of the Meuse and its tributaries, where better climatic conditions are found and where richer soils exist. Fruits, including the vine, and oats are the chief crops, whilst cattle and sheep are reared in the uplands.

The Belgian Coalfields.—Coal is mined in three basins in the belt which stretches from Aachen to the middle of the Franco-Belgian frontier. In the west the Hainault coalfield is continuous with that of France. The chief mining centre is *Mons*. The Sambre coalfield has *Charleroi* as its mining centre. The third coalfield, which stretches from *Namur* to *Liège* and beyond into Germany, is the largest in area. Some iron is obtained in the Ardennes, but Belgium depends upon Luxemburg and France for the greater part of the iron ore required for her extensive engineering industry.

Liège engages in the manufacture of machinery, ordnance, firearms and steel rails. *Namur* has engineering works, but is especially noted for cutlery. Iron-smelting and the manufacture of machinery are carried on at *Mons* and at *Charleroi*.

Communications.—The surface of Belgium is covered with a network of river, canal, road and railway communications. The central position of Brussels, the capital, has made it the focus of the railway communications of Belgium. It does not, however, lie on what is perhaps the most important route through the country, *i.e.* the route from Paris to Berlin which follows the line of the Oise-Sambre-Meuse, and thus skirts the margin of the Ardennes highlands.

THE BELGIAN PEOPLE.

A line drawn across Belgium from east to west, and passing a little south of Brussels, roughly divides the

country into two very different structural and economic regions, the agricultural lowlands and the older rocks of the coal measures and the Ardennes highlands. It also roughly divides the people into two distinct races. North of that line the bulk of the people are the tall, fair *Flemings*, who are closely akin to the Dutch in race and in language. South of the line are the French-speaking *Walloons*, a shorter and darker people. The bond which has kept these two very different peoples together is a religious one, for both Flemings and Walloons are Roman Catholics. It is this bond which has caused the Flemings to ally themselves with the Walloons rather than with the Protestant Dutch. The presence of two languages also accounts for the fact that the names of many towns are commonly given in both forms, *e.g.* Antwerp and Anvers; Mechlin and Malines, etc.

The broad outlines of Belgian history can be seen in that of its towns. Cities like Bruges, Ghent and Ypres, with their cloth halls, their city halls, their guild houses and their nunneries, are representative of the middle ages, when they were the richest and most prosperous woollen manufacturing cities, not only in Flanders but in the whole of Europe. Antwerp came into prominence with the age of discovery, and is a type of the commercial prosperity which the newly discovered lands brought to western Europe. In Liège and Mons we have types of the industrial developments of the nineteenth century, whilst in all ages Brussels has been a capital city, Louvain the leading intellectual centre, and Malines the chief ecclesiastical city.

LUXEMBURG.

The northern part of this tiny state forms part of the Ardennes plateau, the south a part of the Lorraine plateau. Most of the people are engaged in pastoral and agricultural occupations. Agriculture is carried on in the valley of the Moselle, where the vine is extensively grown. Southern Luxemburg is noted for its great

wealth of iron ore, which is extensively mined and exported to Belgium and to Germany.

The little land is a grand duchy. Its neutrality, integrity and independence were declared and guaranteed by the Great Powers, but unfortunately it lies on the Moselle route from the Rhine to north-eastern France, and these guarantees, like those of Belgium, proved to be "scraps of paper." The commercial affairs of Luxemburg were formerly controlled by the German Zollverein, but by the Peace of Paris (1919) Germany renounced all treaties and conventions with the grand duchy. It is very likely that an economic union with Belgium will be arranged.

FRANCE

PHYSICAL FEATURES.

France has a triple outlook to the sea. On the north she has access to the English Channel and the North Sea, on the west to the Atlantic, whilst in the south she has a "window" looking out upon the Mediterranean. In having an outlet to the Mediterranean she has a great advantage over sea-girt Britain, but she has had the disadvantage of having the least safe part of her land frontier in common with Germany, from whom she has had most to fear, and from whom she has so profoundly differed. From Spain, Italy and Switzerland, countries with whom she has many things in common, France is cut off by the high mountain walls of the Pyrennees, the Alps and the Juras.

The central plateau is the core of the country. It consists of an ancient crustal block which has been faulted and tilted, so that it presents a very steep and regular escarpment to the Rhone valley, and a gentle slope towards the west. The steep scarp is known as the Cevennes, which looks like a great mountain wall if viewed from the valley of the Rhone, but from the west it is approached by gentle slopes. In the north-

west of this region are the extinct volcanic Auvergne Mountains, which have been piled up above the general plateau level. These mountains include many well-preserved cones, called Puy, beautiful crater lakes and many mineral springs, near some of which watering-places have grown up. Elsewhere the central massif is



FIG. 59.—The Relief of France.

chiefly composed of limestone, and has areas of karst country, known locally as the Causses. The Tarn, the Lot, and other rivers flowing westwards to the Garonne, are noted for their magnificent cañon and gorge scenery. The poverty of their valleys is in marked contrast to the rich valleys of the Loire and the Allier, which flow northwards. These are filled with rich soil, which is

largely the accumulated volcanic dust carried by the prevailing westerlies from the Auvergne area.

The Côte d'Or, the Plateau de Langres and the highlands of the upper Meuse form lower north-eastern extensions of the highland of the central region, but are composed of newer rocks. They form the watershed between the Seine and Saone, a barrier which very fortunately can be easily negotiated by road, rail and canal.

The Vosges Mountains are now entirely in France. Between the steep eastern slopes of the Vosges and the Rhine lie the rich alluvial rift-valley lowlands of eastern Alsace and Lorraine which structurally belong to the Central Highland belt (see p. 216).

France has extensive lowlands. Along the Mediterranean the low, lagoon-bordered coasts of the Gulf of Lions are in marked contrast to the hilly Riviera coasts of the Gulf of Genoa. But the most extensive lowlands are west, north-west and north of the Central Highlands. In the south-west the coastal belt consists of the lagoon-bordered *Landes*, whose sand-dunes, formed by wind-blown sand, are now checked from creeping inland by means of the planting of pine trees and grasses. The forests not only yield timber and turpentine, but also protect the vineyards from the sand-storms which formerly did great damage. The peninsulas of Brittany and Normandy, which may be compared with the south-western peninsula of England, are built of old, hard rocks, whose higher portions stand out as more or less barren and desolate moorlands, but the lowlands are covered with rich soil. The Paris Basin has marked physical resemblances to the great lowland of south-eastern Britain. It is a land of limestone and chalk scarplands and rich clay vales, whose diversity of structure has led to diversity of landscape, soil, natural vegetation and cultivated crops. In the extreme north-east the land adjoining Belgium is very flat, whilst belts of sand dunes are encountered along the coast.

The mountainous island of *Corsica* belongs to France, although in physique, race and language it is Italian.

Like Sardinia, it is composed of granite and other ancient rocks. Along the coastlands the products are of the "Mediterranean" type. *Ajaccio*, the birthplace of Napoleon, is the chief town and port.

THE RIVERS OF FRANCE.

The *Garonne* and the *Dordogne* derive most of their waters from very different regions, the former chiefly from the Pyrenees, the latter from the central plateau. The middle plain of the *Garonne* is a rich alluvial region which has been called the "Granary of south-west France." The *Loire* and its chief tributary, the *Allier*, rise in the central plateau and at first flow northwards in parallel valleys of great fertility, but later bend westwards. The plains of the middle and lower *Loire* basin, *i.e.* those parts lying south of the Normandy heights and north of the central plateau, form one of the richest regions in France. It is known as the "Garden of France." The *Seine* is the most important French river. The main stream and its chief feeders, the *Yonne* and the *Marne*, rise in the plateau separating the basin of the *Seine* from that of the *Saone*. Except for the *Oise*, and its tributary the *Aisne*, all the important feeders reach the main stream above Paris. One result of this is seen in the floods from which Paris has often suffered. The *Seine* basin is so small that the same meteorological conditions normally obtain over all parts of it. Therefore in times of unusually heavy rains or of melting snow, the waters are concentrated above Paris and the river rises abnormally. Fortunately it is easy to anticipate, and to take precautions against, such occurrences. Below Paris the *Seine* meanders across its lower plain to its estuary. The *Somme* basin, which is included with the *Seine* in what is called the Paris Basin, is separated from that river by low divides. It is one of the clay vales of the scarplands of the Paris basin.

The *Rhone* rises, like the *Rhine*, in Mont St. Gothard. Before entering France it passes through Lake Geneva,

which acts as a great filter. At Lyons it is joined by the slow-flowing, clear Saone, its Burgundian tributary, and turns southwards. Further on it receives the Isère whose head-stream leads to the Little St. Bernard Pass, and at Montélimar enters the typical Mediterranean environment. The Rhone, like all Mediterranean rivers, has a delta, which is rapidly increasing in extent. Unfortunately it is fast-flowing, and is not very deep, so that it is not of great use except for downstream traffic. Its valley, however, is of enormous value as a route leading from the Mediterranean to the Paris basin.

Now that France once more possesses Alsace-Lorraine her territories reach the left bank of the middle Rhine, the most important commercial river highway of Europe. The navigation of the Rhine from its mouth to the Swiss frontier is free to all nations.

CLIMATE.

The lowlands to the west, north-west and north of the Central Highlands have the equable distribution of temperature enjoyed by Western European lowlands open to the influence of winds from the Atlantic Ocean, but the influence of latitude is seen in the warmer temperatures of the south, especially in winter. The rain falls at all seasons, but on the whole, winter is the wettest part of the year. These conditions will be recognized as belonging to the Western European type of climate. The Central Highlands have a colder climate, due, of course, to altitude, whilst the rain, although falling at all seasons, chiefly occurs in summer, but the sheltered lowlands between the Vosges and the Rhine enjoy higher temperatures than elsewhere in Central France. Central France is climatically as well as physically a part of the Central European region. In the lowlands of the lower Rhone, along the shores of the Gulf of Lions and in the Riviera, the mild, wet winters and the warm, dry summers indicate the Mediterranean type of climate.

CHIEF INDUSTRIES.

Agriculture.—The cultivation of the land is the most important French industry. The largest area is devoted to wheat-growing, which is followed, in order of area devoted to production, by oats, vines, potatoes, rye, barley and the sugar-beet. Hemp and flax, mulberries, olives and tobacco are also important agricultural products.

In northern France, where the climate resembles that of southern England, the products also show a close resemblance. The north-western peninsulas with their dairy-farming, market-gardening and fruit-growing may be compared with south-western England; the Paris basin, with its rich agricultural clay vales and its scarp-lands, engages in the production of cereals and in the rearing of sheep like south-eastern Britain. To this must be added the beet, flax and hemp of the plains bordering Belgium. In the rest of France the vine is the chief crop, but cereals remain of great importance in the basins of the Loire and the Garonne. The Central Highlands are of little importance, except where the valleys are fertile, and are chiefly used for the rearing of cattle and sheep, whilst the Mediterranean lands are the best wine lands and also produce olives, mulberries and other Mediterranean fruits.

Mining and Manufacturing.—The mineral wealth of France is inferior to that of Britain, and as a consequence there is less manufacturing.

The North-Eastern Coalfield.—This coalfield, which extends into Belgium, is the most important industrial area in the country. Some iron is found locally, but most of that used in the engineering and other iron industries is introduced from Lorraine, and from the district of Nancy. The chief textile industries of France are also located on this coalfield. The local flax and wool are insufficient to meet the demands of the linen and woollen mills, so that these raw materials have to be imported.

Lille, Valenciennes and Roubaix are engaged in engi-

neering and textile trades. On account of its iron trades Lille may be described as the "Birmingham" of France. It has also woollen, cotton and sugar-refining industries. Valenciennes specializes in lace, whilst in Roubaix woollen manufacturing is of greatest importance. *Cambrai* is noted for its linens. *Amiens* and *St. Quentin* are also engaged in textile trades, particularly in the weaving of cotton cloth. *Rouen* is the centre of another cotton manufacturing district, although it is a considerable distance from the coalfield. But it was through Rouen that cotton was first imported, so that the industry got an early start, and the workmen became so skilled that the manufacture was able to continue even when the disadvantages of being away from coal began to make themselves felt.

The Saar-Basin Coalfield.—Partly as compensation for the destruction of coalmines in north-eastern France, and partly as payment on account of indemnities, the Treaty of Versailles (1919) compelled Germany to cede to the League of Nations the ownership of the coalmines of the Saar Basin (see Fig. 63). At the end of fifteen years a plebiscite will be taken to decide whether the inhabitants desire French, German, or League of Nations' control. There are no very large towns, for the coal is not so much used to support local industries as for export to meet the needs of a wide area extending even to Switzerland and Italy.

The St. Etienne Coalfield has both iron and coal. Therefore St. Etienne has become an important engineering centre, while its nearness to the Mediterranean area has led to the growth of 'silk manufacturing. This industry, however, is chiefly centred at *Lyons*, at the confluence of the Rhone and the Saone. The local supply of raw silk is supplemented by imports from Italy, China and Japan.

The Le Creusot Coalfield is also fortunate in possessing iron as well as coal. At Le Creusot there are works engaged in the production of steel rails and locomotives for the state railways, but the town is best known for its ordnance works.

Lorraine is very rich in iron ores which were formerly chiefly manufactured in the Ruhr valley. The iron wealth of the Briey basin, and the steel works of Longwy, north-west of Metz, are also worthy of mention.

In many towns on both flanks of the Vosges, cotton manufacturing by means of water-power is becoming very important. Belfort, Epinal, St. Dié and Mulhausen are engaged in this industry.

Fishing.—The chief French fishing ports are on the north coast. The fishing vessels of Fécamp, Dieppe, Boulogne and Dunkirk ply their trade not only in the narrow seas—including Dogger Bank fishing—but even proceed as far afield as Iceland and Newfoundland. These northern ports are the chief markets for cod and herring. The ports of the north-western peninsulas are engaged in sardine, tunny and mackerel fisheries. In western France there are also many fishing ports, of which La Rochelle is the most important. On the south coast the chief fishing grounds lie west of the Rhone, where the shallow seas are of the greatest extent. *Cette* is the centre.

MEANS OF COMMUNICATION.

The land communications of France converge, in a most remarkable manner, upon Paris (see Figs. 59 and 60). *Paris* grew up just below the confluence of the Seine and the Marne, in the "Isle of France," upon which several river-valleys converge. Fortunately at this point the presence of an island gave an easy crossing as well as a good means of defence. From this island, the Île de la Cité, on which stands the famous cathedral of Notre Dame, the city of Paris grew outwards and outwards, until to-day it has a population of nearly three millions. Owing to the fact that the city is exposed to attack from the north-east and east—the historic fear of Paris—it has always been very strongly fortified, and as it outgrew its ring of fortifications, these were dug up and turned into wide, tree-lined streets called boulevards. The routes which converge

upon the city are shown on Fig. 60. They should be studied in detail. Paris may be compared with London. Both cities have grown up around an easy crossing-place of a river; both stand on navigable rivers which give them access to the sea; both stand at the heart of rich agricultural lands from which they have largely drawn their wealth, and in which they remained until com-



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FIG. 60.—France. Communications.

paratively recent days the only large centres of population. In the case of Paris, even to-day there are no really large towns until the edges of the Paris basin are reached. As regards its industries, it should be noted that Paris, like London, lies away from coal and iron. It is famous for articles of fashion and art, *e.g.* jewellery, millinery, gloves, etc.

Dijon deserves special mention as a railway centre. It lies in the Saone valley, and commands an easy route across the Côte d'Or to the basin of the Seine (see Fig. 60). It is, therefore, the meeting-place of routes from Switzerland, from Brindisi and from Marseilles.

France has also an excellent system of canals, which supplement the rivers and connect one river-basin to another, so that it is possible to transfer goods from one part of the country to another without break of bulk. Those carrying the greatest tonnage connect the ports of Calais and Dunkirk with the Lys and the Scheldt, and thus with the Belgian inland waterways, and by the help of the St. Quentin canal, with the Oise, which is in turn connected with the Sambre. The Oise and its tributary canals bring supplies of coal to the capital.

The Rhine-Marne canal, which passes through the Gap of Zabern to Strassburg, and the Rhine-Doubs canal, which also reaches Strassburg, but in this case by way of the Burgundian Gate, connect the basins of the Seine and the Rhone with that of the Rhine. Now that France once more reaches the left bank of the Rhine, these canals will become of increasing value. The importance of *Strassburg* (= the Castle by the Road) as a great focus of railways, roads and water routes should be noted very carefully. The Seine and Rhone basins are connected by the Burgundian canal, which joins the Yonne to the Saone and passes through Dijon. The Seine and Loire basins are connected by two canals, the more important leaving the Loire just below Orleans, where the rivers come nearest together. The Canal du Centre gives communication between the upper Loire and the Saone, whilst the Canal du Midi, from Toulouse to Cette, connects the Mediterranean with the Atlantic.

THE COMMERCE OF FRANCE.

France is so largely self-supporting in agricultural products that the industries which employ least people

actually appear the most prominent in the trade returns. The chief imports are largely the raw materials for manufacturing industries, and the chief exports manufactured goods.

The principal port is *Marseilles*, which lies east of the Rhone delta. The old port, founded by the Greeks, has a small but very safe harbour, whose entrance is narrow and rocky. The modern port extends westwards for about three miles along the narrow coastal plains, above which the town climbs the lower slopes of the hills. Its great importance is due to the fact that it commands the route along the narrow Rhone corridor to Dijon, and beyond to the Paris basin and the northern ports (see Fig. 60). It is thus a great packet-station for the routes to the East. Its chief industries—wine, silk and oil (hence soap-making)—are dependent upon the peculiar products of the Mediterranean region in which it lies; but all of these industries have outgrown the local supply. It imports wine from Algiers, silk from China and Japan, and oil-seeds, palm-oil and copra from the great tropical forest regions of Africa and the East Indies. It is the port for Lyons.

Havre, at the mouth of the Seine, chiefly trades with America and England. *Dunkirk* is the port for the industrial region in the north-east. *Nantes* (outport, St. Nazaire) has an important trade in colonial produce, e.g. coffee, sugar, etc. *Bordeaux* trades in wine.

The chief French naval stations and Government dockyards are *Cherbourg*, on the north coast; *Brest*, *Lorient* and *Rochefort*, on the west coast; and *Toulon*, on the Mediterranean.

CONCLUSION.

The greatness of France is largely due to a great geographical fact. She stands at the meeting-place of two great routes. A physical map shows that the great lowland highway from Asia across the central plain of Europe meets in the Paris basin those routes which pass from the Mediterranean Sea via "Rhone

corridor," or around the western margins of the central plateau (Fig. 59). Therefore, throughout the story of man in Western Europe, the Paris basin has been the meeting-place of peoples, and therefore of cultural influences from two very different regions, the great plain on the one hand and the great sea on the other. These influences have been assimilated and have profoundly influenced French life and thought.

The western and northern plains, the central highlands and the north-western peninsulas, and the Mediterranean region have each contributed their quota to the people of France, for their inhabitants are representative of the three main racial divisions of Europe. The vivacity and artistic temperament of the people of the Mediterranean region, the energy, persistence, endurance and earnestness of the people of northern France have each had a share in the making of the greatness of modern France. We are too prone to estimate the French from ideas, often mistaken, of Paris, as though the metropolis were the mirror of the peasantry—the real nation. The bulk of the French people are agriculturists, and surely never did a people so show its greatness as did the French peasant armies during the Great European War! But the activities of the French have not been confined to the land. Frenchmen take naturally to the sea, and the results are seen in the long list of intrepid explorers and navigators of French nationality, in the great part France has taken in the story of exploration, as well as in the extent of her colonial empire. It must not be forgotten that Britain's struggle for supremacy in North America and in India was with France.

CENTRAL EUROPE: GERMANY.

PHYSICAL FEATURES.

Germany readily falls into two main physical units: Low Germany, or the North German Plain and High Germany, or the Southern Highlands.

The North German Plain.—The North Sea coasts are low plains, some below sea-level and protected from inundation by sand dunes and dykes as in Holland. These low plains, which may be compared with the English fens, have been extensively drained and form good agricultural land. Behind the fenland are heath-covered sandy wastes known as the *geest*. The Baltic coasts are rather higher and there are no fenlands, but the sea is shallow and the sandy coast gives few harbours. Even the river mouths are of little value owing to the action of currents which build sandpits or bars across them. These enclose lagoons, called *haffs*, in which the rivers deposit their load of débris and build up deltas. The land behind the coastal belt is extensively covered with glacial débris, which attains the height of hills in the Baltic Heights.

The pine-covered Baltic Heights are responsible for a very marked feature in German rivers. Notice how these suddenly change direction in their middle courses. For example, the middle Elbe appears to be making for the western end of the Baltic, but a fortunate bend takes it out to the incomparably more important North Sea. Notice also the large number of east and west rivers which flow between low ridges of glacial drift, etc. These render the making of canals for east and west transit a matter of comparative ease (see Fig. 61).

The rest of the North German Plain consists of sandy or boulder clay covered areas: the former being comparatively poor and infertile, but yet extensively devoted to potato growing, the latter providing the richer beet-producing lands.

The Southern Highlands.—This is a very highly complicated region of ancient folded ranges worn down to their stumps and then uplifted, of fractured and tilted blocks of the earth's crust, of basin-like depressions, and, in places, of past volcanic activity. This complexity of structure and relief is reflected in its complicated political history, for whereas the uniformity of the northern plain encouraged the growth of one dominating political power, Prussia, the southern highlands is divided into a number

of political units. We may divide the southern highlands into the following physical divisions:—

(i) The Lower Rhine Highlands, through which the river has cut a narrow gorge between Bingen and Bonn, is an ancient peneplain which has been uplifted. As gradual uplift took place the river maintained its course by cutting and progressively deepening its gorge. The Rhine and its tributaries, the Moselle and the Lahn, have

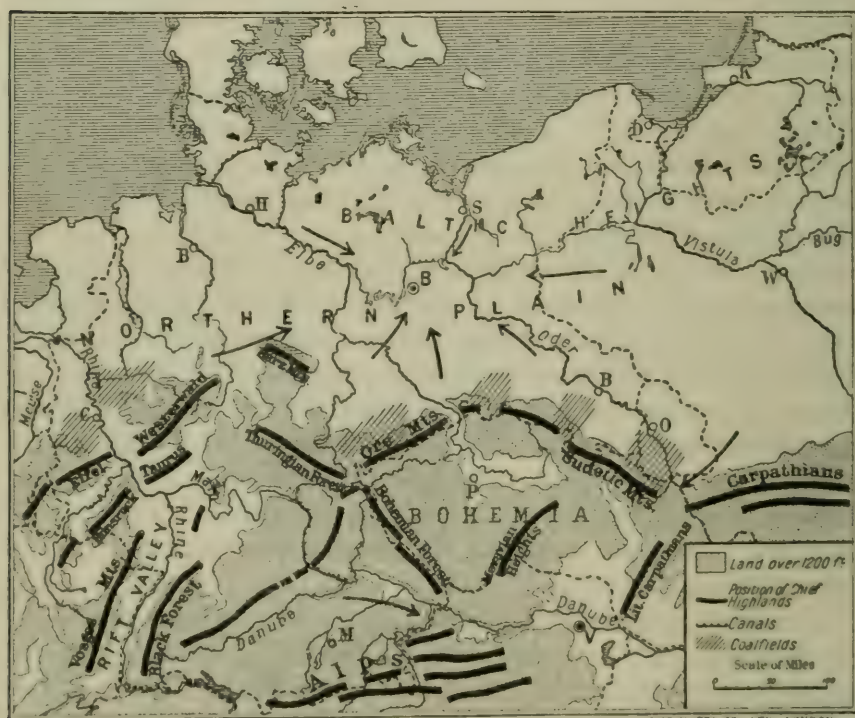


FIG. 61.—The German Plain and the Highlands of Central Europe.

divided these highlands into four blocks. Of these the Eifel region is famous for its extinct volcanoes and its crater lakes (see Fig. 61).

(ii) The Vosges and the Black Forest (Schwarz Wald), together with their northern extensions, once formed a single block, whose central part subsided between a series of parallel faults, and thus formed a rift valley some 200 miles long and twenty miles broad. This valley, which stretches from Basel to Mainz, is the middle basin of

the Rhine and is in marked contrast to the narrow gorge between Bingen and Bonn. Its floor has been covered by alluvium so that it is a region of great fertility. On either side of the valley the steep escarpments rise abruptly from the plain, but on the outward slopes the descent is more gradual.

(iii) The ridges radiating from the Fichtel Gebirge should be studied on a physical map. The Bohmer Wald (= Bohemian Forest), the Erz Bebirge (= Ore Mountains), the Riesen Gebirge (= Giant Mountains), the Sudetes and the Moravian heights form a highland framework for the low, diamond-shaped Bohemian plateau, really a basin-like depression filled with more recent measures. The Franconian and Swabian Jura and the hills forming the basins of the Main and the Neckar, are scarplands whose steep faces look north-westward. The Harz Mountains, an isolated mass of ancient rock, mark a continuation of the line of the Sudetes, as do the Weser highlands further north-west.

(iv) The Alps and the Alpine Foreland are in the extreme south. The Alpine Foreland is a low plateau, largely covered with morainic hills and lakes in the south, and by beds of porous gravel further north. In the southern portions the gravel is very thick, but towards the north it becomes so thin that the underground water comes to the surface and forms swamps, as in the district north of Munich.

CLIMATE.

The influence of the relief is seen in the distribution of temperature, for the elevation of the south counteracts the influence of latitude, and results in a fairly uniform temperature distribution. Only in the rift valley are there seven months with a mean monthly temperature exceeding 50° F., whilst this is the only part of the country which has one whole month exceeding 68° F. It should be noted, too, that the further east we go, the climate becomes a little more extreme.

The rainfall is brought by the prevailing westerlies,

and its distribution shows a marked connection with the relief, although, as should be expected, the amount diminishes from west to east. This is clearly shown on the northern plain, whose western half is better watered than its eastern half.

CHIEF OCCUPATIONS.

Most of the highlands are forested, hence the frequency with which the word *wald* (= forest) is applied to them. Two-thirds of the forested areas consist of conifers, *e.g.* the silver firs of the Black Forest and the Vosges; the firs, pines, spruces and larches of the Alpine foreland, the Fichtel Gebirge (= Fir Mountains), and the Sudetes; and the pines and firs of the Baltic Heights. Deciduous forests cover one-third of the forested area. They include the oaks of southern Germany and the beeches of the Baltic borderlands.

The forests of the southern highlands yield valuable timber, which is sawn up by power derived from the waterfalls and then floated downstream to the markets. They have also led to the establishment of the famous toy industries of Nuremberg (the "toy capital" of the world), Gotha and other towns.

Agriculture.—The northern plain, despite its rather severe climate, is the chief agricultural region. Naturally infertile, except in places covered with boulder clay, this plain has been made productive by the application of science to agriculture. Careful drainage and heavy manuring, especially with artificial manures from the Elbe basin and from Chile, have worked great changes, so that to-day about half is under crops.

The chief crops are rye, from which the so-called black bread is made, oats, wheat, potatoes and beet. Flax and hemp are also grown and exported from the Baltic ports. The industrial bias of German agriculture is shown in the number of alcohol distilleries and starch factories (both based on the potato), beet-sugar factories and linen mills. The chief beet-producing areas are in the centre and north-east, and important sugar-refining

towns are Magdeburg, on the Elbe, and Frankfurt, on the Oder. Most of the wheat, barley, vines, hops and tobacco are grown in the river valleys and basins of the Southern Highlands, the richest part of which is the alluvial plain of the central Rhine rift valley. The sunny slopes of the river valleys are terraced, and on these the vine flourishes. Hops and tobacco are extensively cultivated in Bavaria, where brewing is an important occupation at Munich and other centres.

Pastoral Occupations.—The pastoral occupations of Germany show an interesting connection with her agriculture development. During the last thirty years pigs have increased in numbers over 300 per cent., whilst sheep-rearing has decreased by the same amount. This is partly due to the breaking-up of pasture land on the northern plain in order to grow root-crops, particularly the beet, the food of the pigs after the sugar has been extracted. The keeping of cattle is carried on in almost all parts of the country, the numbers showing a steady increase. Some districts, *e.g.* those adjoining Denmark, are noted for their dairy produce. Kiel exports large quantities of butter, etc. Silesia and Saxony are the chief sheep-rearing regions.

Mining and Manufacturing.—The chief coalfields are located on the margins of the Central Highlands.

(i) *The Ruhr Valley or Westphalian Coalfield.*—This is the chief industrial area in the country. Iron, as well as coal, is found, but not in sufficient amounts to supply the iron and steel works. The great waterway of the Rhine, which is the chief entry for imported ores, the numerous canals and the excellent railway facilities, render the importation and distribution of imported ores a matter of comparative ease. The same facilities also assist the importation of raw materials for the textile trades (cotton, wool, etc.), and of grain for food. The vast Krupp iron and steel works are at *Essen*; at *Dortmund* and *Diüsseldorf* all kinds of hardware are made, whilst *Solingen* is noted for its cutlery. The twin city of *Elberfeld-Barmen* manufactures chemicals, but is perhaps noted more for its silk, cotton and woollen

goods. *Krefeld*, as a silk manufacturing town, ranks with Milan and Lyons. *Düsseldorf* and *Cologne* are the great river ports. Near the Belgian frontier, but not on the Ruhr valley coalfield, stands *Aachen*, noted for its woollen goods, particularly blankets and broadcloths.

From a German standpoint this great industrial area suffers from one serious drawback. Its natural outlet is along the Rhine, and the mouth of that river is controlled by Holland. Another outlet lies across Belgium. In order to attract some of the trade to German harbours the Dortmund-Ems Canal was constructed, but even cheap rates and patriotic appeals have not deflected much trade from the natural outlet. In this connection it may be pointed out that less than half of the pre-war German trade with Britain was conducted through German ports.

(ii) *The Saxon Coalfields* are much smaller than the one just described. The coal is found in two areas: one, the larger, extends from Zwickau to Chemnitz; the other is near Dresden. Iron ore, as well as tin, silver and zinc, are obtained in the Ore Mountains, but much iron has to be imported from Lorraine and Sweden. *Chemnitz* and *Zwickau* are the centres of a group of textile manufacturing towns. *Dresden*, the capital of Saxony, stands on the Elbe. The famous Dresden china is made at Meissen, several miles further down the valley. The city is noted for its art galleries, museums, etc. *Leipzig*, situated on the plain, just north of the margin of the highlands, is not on the coalfield, but is one of the most important cities in Germany, owing to its central position with regard to inland trade. Its great fairs attract merchants from all the countries of Europe. It has extensive printing works, and manufactures all kinds of musical instruments, especially pianos.

(iii) *The Silesian Coalfields*.—Coal is mined in the districts of Breslau and Waldenburg, but principally in southern Silesia. There, in the region of the Moravian Gate, and extending into Poland, is one of the largest coalfields of Europe. The Riesen Gebirge (= Giant

Mountains), the Sudetes, and the low plateau of southern or Upper Silesia are all rich in iron, lead and zinc. This combination of coal and valuable minerals, together with an abundant local supply of wool, has led to the growth of many manufacturing towns, but as this development is comparatively recent, partly owing to its somewhat isolated position, there are at present very few large towns. *Breslau*, the Silesian capital, *Liegnitz* and *Görlitz*, all in lower Silesia, are woollen manufacturing centres, manufacturing not only local wool, but imported wool from Argentina, Australia, etc.

The *Harz Mountains* are the centre of varied mining occupations. Lignite, iron, silver, and other minerals are mined. In the *Stassfurt* district, which lies near the eastern base of the Harz, there are great deposits of rock salt and of potash salts. *Stassfurt* has great chemical works, which prepare chemicals for use in textile trades, and for use as artificial manures in agriculture.

CHIEF CITIES AND ROUTES.

Berlin occupies a splendid position for its function as capital, being centrally placed in the northern plain almost at the intersection of diagonals from the four corners of the country. Built amid an infertile lakeland country, it owes the fixing of its site to the fact that the routes converging upon it found an easy crossing-place of the Spree at a point where the firm banks, the narrow river and the presence of an island facilitated bridging. Like most large centres of population, Berlin has become a great manufacturing city, especially of machinery, clothing and scientific instruments. The site of *Magdeburg* is in some respects equal, if not superior, to that of Berlin. It is centrally placed, it commands east and west routes along the margins of the Central Highlands, it has the advantage of being on the Elbe, the great central river, and it is in an excellent position with regard to routes to Munich and

Venice. We have in Magdeburg another example of a city which has developed at a point where a great route—here the route skirting the margin of the Central



FIG. 62.—The Basin of the Rhine.

Highlands—found an easy crossing-place of a river owing to the presence of islands.

Some of the most important cities in Germany are on or near the Rhine, and all command important routes.

Cologne has a site whose leading feature is that of many other cities—*i. e.* it stands where an important river leaves its mountain course for the plains at the point where the great roads and railway routes skirting the mountains meet the routes following the river. To this point all routes from various parts of the plain and from the ports must come before they can proceed along the narrow gorge (see Fig. 62). Another important factor in its site is that it stands at the normal navigation limit for ocean-going ships. It is a river port for the Westphalian industrial area, and has important textile, glass and chemical industries of its own. Special manufactures are of scent and chocolate. As its name implies, *Cologne* (= the Colony) is an old Roman town. The Rhine formed the frontier of the Roman Empire, and therefore we find several Roman cities on or near the left bank, *e. g.* Coblenz, Mainz, Strassburg and Basel. *Coblenz* (= the Confluence) stands half-way along the Rhine gorge at the confluence of the Moselle and the Rhine, and sufficiently near the point at which the Lahn enters the main stream, on the opposite bank, to draw to itself the importance of being at its confluence. • It is thus a great meeting-place of routes. *Mainz* stands at the northern end of the rift valley of the middle Rhine, opposite the confluence of the Main and the Rhine. *Frankfurt* (which should not be confused with Frankfurt-on-Oder) also stands at the head of the rift valley at a point where many routes meet. It is a great banking and commercial centre. *Mannheim*, built on the low ground at the confluence of the Neckar and the Rhine, is the normal head of the river steamer navigation.

The Orient Express Line (Paris–Constantinople) enters Germany soon after leaving the French city of Strassburg. It winds round the northern base of the Black Forest to Stuttgart, and from thence via Ulm, at the navigation limit of the Danube, to Munich, the Bavarian capital. *Munich*, the third largest city in the country, has grown with great rapidity during recent years. The chief town of the Alpine Foreland, it stands on the

Isar, between forests to the south and marsh and moor to the north (see p. 217), at the meeting-place of great east to west and north to south routes. By far the chief of the north to south routes proceeds via the Inn valley, the Brenner Pass, and the Adige valley, to the plain of Lombardy. The city has important engineering (locomotives and motor-cars) and brewing industries. The lack of coal is partly compensated for by an abundance of water power.

The *inland waterways* of Germany form a very complete river and canal system. As we have seen, ocean steamers can ascend the Rhine to Cologne, large river steamers to Mannheim and Frankfurt, and smaller ones to Strassburg where they may proceed by canal to the Seine or Rhone basins. Small river steamers may also navigate the Main, and at Bamberg enter Ludwig's Canal, which will take them via Nuremburg, to the Danube near Ratisbon. It is proposed to increase the capacity of this canal. We have already mentioned that the Rhine is joined to the Ems by the Dortmund-Ems Canal. The Elbe and Oder are linked together by the Friedrich-Wilhelm Canal, but at present they have no canal connection with the Weser. The Oder is connected to the Vistula, now a Polish river, by two canals. The Elbe estuary is brought into close connection with the Baltic by two canals, one from Hamburg to Lübeck, and the other, the famous Kiel or Kaiser Wilhelm Canal, which is open, except in war-time, to the ships of all nations. The navigation of the great German rivers (Rhine, Elbe and Oder) is also free to all nations.

THE CHIEF PORTS OF GERMANY.

Germany's foreign commerce is carried on through many ports, some of which are not in the country itself—*e.g.* Rotterdam and Antwerp. *Hamburg*, the chief continental port—and by far the chief German port—grew up at a convenient crossing-place at the head of the estuary of the Elbe. The extensive system of railways

and navigable waterways which converge upon the Elbe estuary gives it a hinterland which includes not only the whole of the Elbe basin, but also the middle and upper basin of the Oder, including Silesia. The port is also a great industrial centre, with shipbuilding and repairing, wheat-milling, soap-making and other industries. Its outport is Cuxhaven, a busy fishing port. *Bremen*, an older port than Hamburg, stands on the Weser, some thirty-five miles from its mouth. Owing to the increased size of modern steamers the outport of Bremerhaven has been established for the accommodation of the largest ships. Bremen has a large import trade, particularly of cotton, rice, tobacco and other American goods. *Wilhelmshaven*, on Jade Bay, an old estuary of the Weser, is well placed for its function as a naval station.

The chief Baltic ports are *Kiel*, *Lübeck*, *Rostock*, *Stettin*, and *Königsberg*, the port of the isolated East Prussian province. The approach to most of these ports is difficult owing to the formation of haffs. It is, therefore, necessary for the provision of outports in order to accommodate the larger ships. The trade is largely in Baltic produce, *i.e.* dairy produce (especially in the west), grain, sugar and potatoes; timber, hemp and flax (particularly from the eastern ports). *Stettin* (outport Swinemünde), the third port in the country and the chief port of Prussia, stands on the Oder. It has extensive shipbuilding (*e.g.* the famous Vulcan yards) and sugar-refining industries. *Lübeck*, once more important than Hamburg, was the chief of the cities which formed the Hanse League for the extension and protection of commerce. *Kiel*, the port of an important dairy-farming region, also has a large shipbuilding industry.

THE NEW GERMANY.

Figs. 63 and 64 give the boundaries of Germany as fixed by the Treaty of Versailles, 1919. The loss of Alsace-Lorraine, the Saar basin, the small Malmédy strip, German Poland, northern Schleswig and the ports

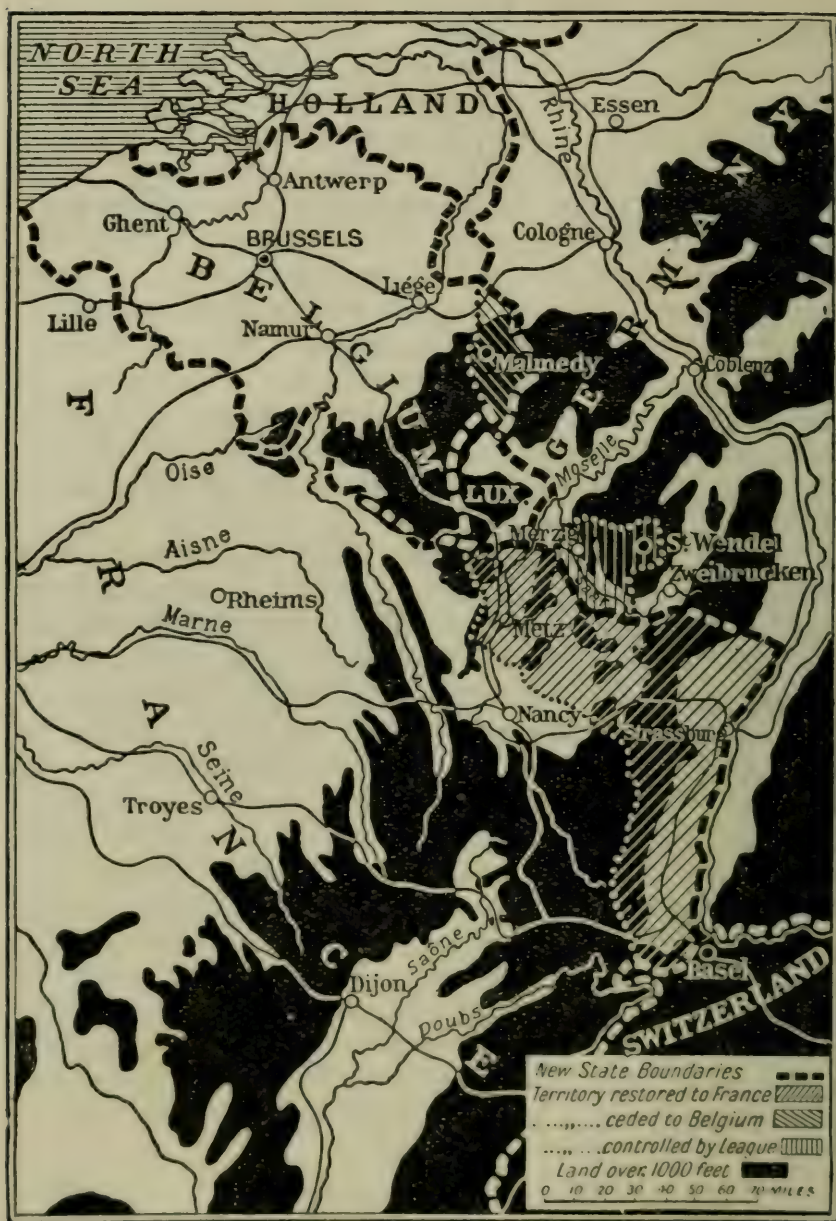


FIG. 63.—The New Western Frontier of Germany.

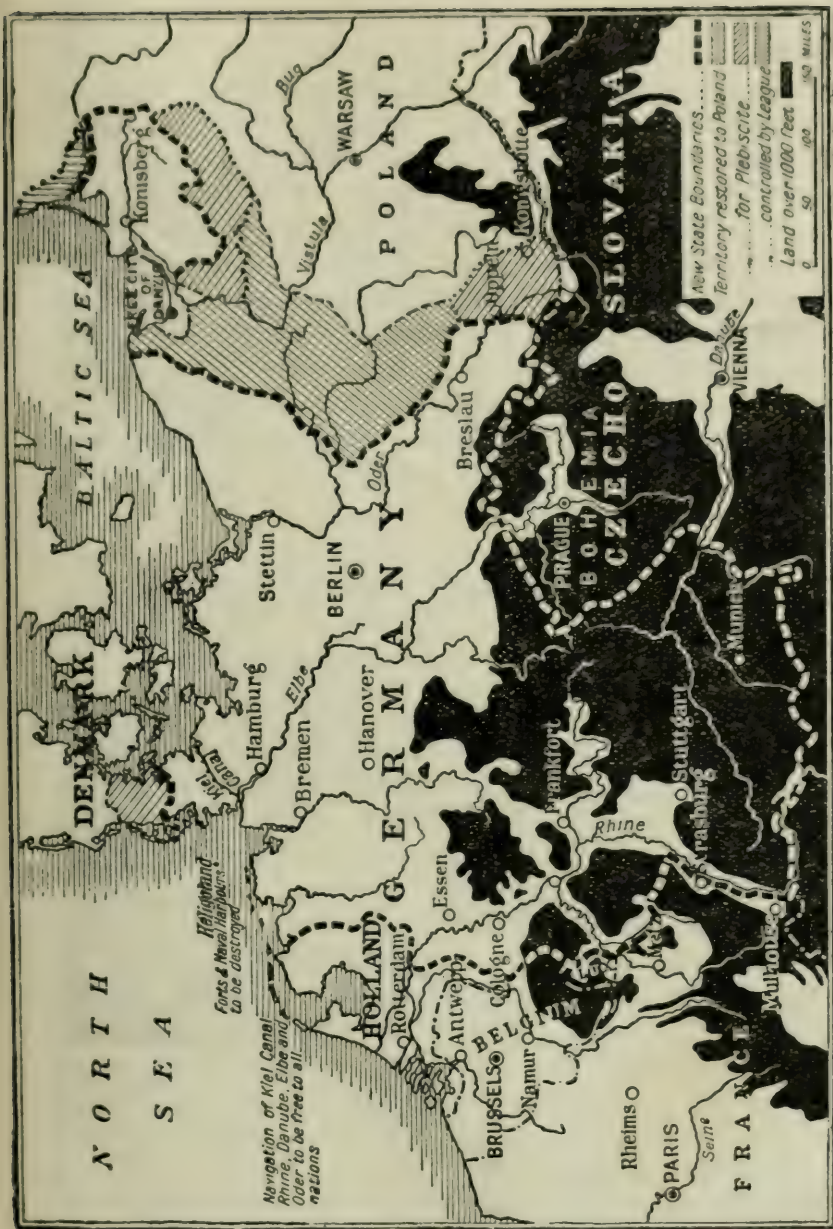


FIG. 64.—The New Germany. It should be noted that the southern part of the Danish plebiscite area and the Allenstein and Marienwerder areas of East Prussia have voted to remain in Germany. The Upper Silesian plebiscite has been held, but the new boundary as between Germany and Poland has

of Danzig and Memel; the isolation of East Prussia from the rest of the country; the large indemnities which have to be paid, as well as the loss of all her colonies, are all matters which will seriously handicap the New Germany. That they are fully merited cannot be gainsaid. Germany has got rid of her Prussian ruler and has become a Republic; but it is for the future to see if the lessons of the Great War have really been learned by the masses of the people. If the national aims are changed when Germany once more enters into full relationships with other countries, there is sufficient genius in her people to raise from the ruins of her former greatness, a state which cannot help but take a leading part in the world's affairs. The amazing progress made between 1871 and 1914 is sufficient evidence of this.

CENTRAL EUROPE: THE DANUBE LANDS.

GENERAL CONSIDERATIONS.

We shall now chiefly consider that part of Central Europe which was formerly included within the Empire of Austria-Hungary. To these lands we have given the name "The Danube Lands," but we shall find that we must also discuss some areas which do not come within the drainage area of that great river.

The Danube rises in the Black Forest, and has the upper part of its course across the Alpine foreland, where it receives the Isar and the Inn from the Alps. After passing through the *Austrian Gate*, the gap between the Bohmer Wald and the Alps, the river enters upon the plain of Vienna, where it receives the March, whose valley leads to the *Moravian Gate*. At Pressburg it passes through the *Carpathian Gate*, where the Alps and the Little Carpathians come close together, and enters the Little Hungarian plain. In this plain the river divides into three channels, which unite before the *Hungarian Gate*, between the Bakony Wald and the Tatra, is reached. Leaving the Hungarian Gate the river turns abruptly

southwards, and after passing Buda-Pest meanders across a great flood plain. It is first turned eastwards by the Drave, then southwards by the meandering Theiss and finally eastwards once more by the Save. Soon after Belgrade is passed, the Morava joins the main stream from the right bank, and soon afterwards the river leaves the Hungarian Plain by one more gorge, at whose eastern end are the famous rapids of the *Iron Gates*, now rendered navigable. After passing Orsova, at the Iron Gates, the river flows along the northern margin of the Balkan foreland, which gives a high south bank in marked contrast to the low-lying swampy plains along the left bank. Finally it reaches the Black Sea, where it has built a large delta.

The valley of the Danube was the highway by means of which the Crusaders passed on their adventurous journeys to the Holy City, and along which came invaders from Asia, who reached it either by way of the Russian steppes and the Carpathian passes, or by way of Asia Minor and the Balkans. This part of Europe is thus a land which has been influenced by Europeans and Asiatics, by Christians and Mohammedans. Its physical features are as diverse as its peoples, so that the late dual empire of Austria-Hungary, which controlled most of its central area, was picturesquely called, "A Pudding-Stone of States," "A Conglomerate of Countries, Duchies and Principalities," "A Ramshackle Empire."

Physically, this part of Central Europe is largely grouped around the Alpo-Carpathian system of young folded mountains, but even those parts which belong to this great system are so far-flung, so detached, and so differently placed that, as a whole, they do not form a single unit. The Eastern Alps; the great sweep of the Carpathians and their enclosed plateau of Transylvania; the ranges bordering the eastern shores of the Adriatic Sea; the Great Plain of Hungary, formerly a shallow sea which was filled with deposits brought down from the highlands by the rivers; the Bohemian plateau, a part of the Central European belt of highlands; and the

Rumanian lowlands, which are really part of the Russian plain, are all distinct regions in themselves.

This part of Central Europe may be divided into the following natural regions :

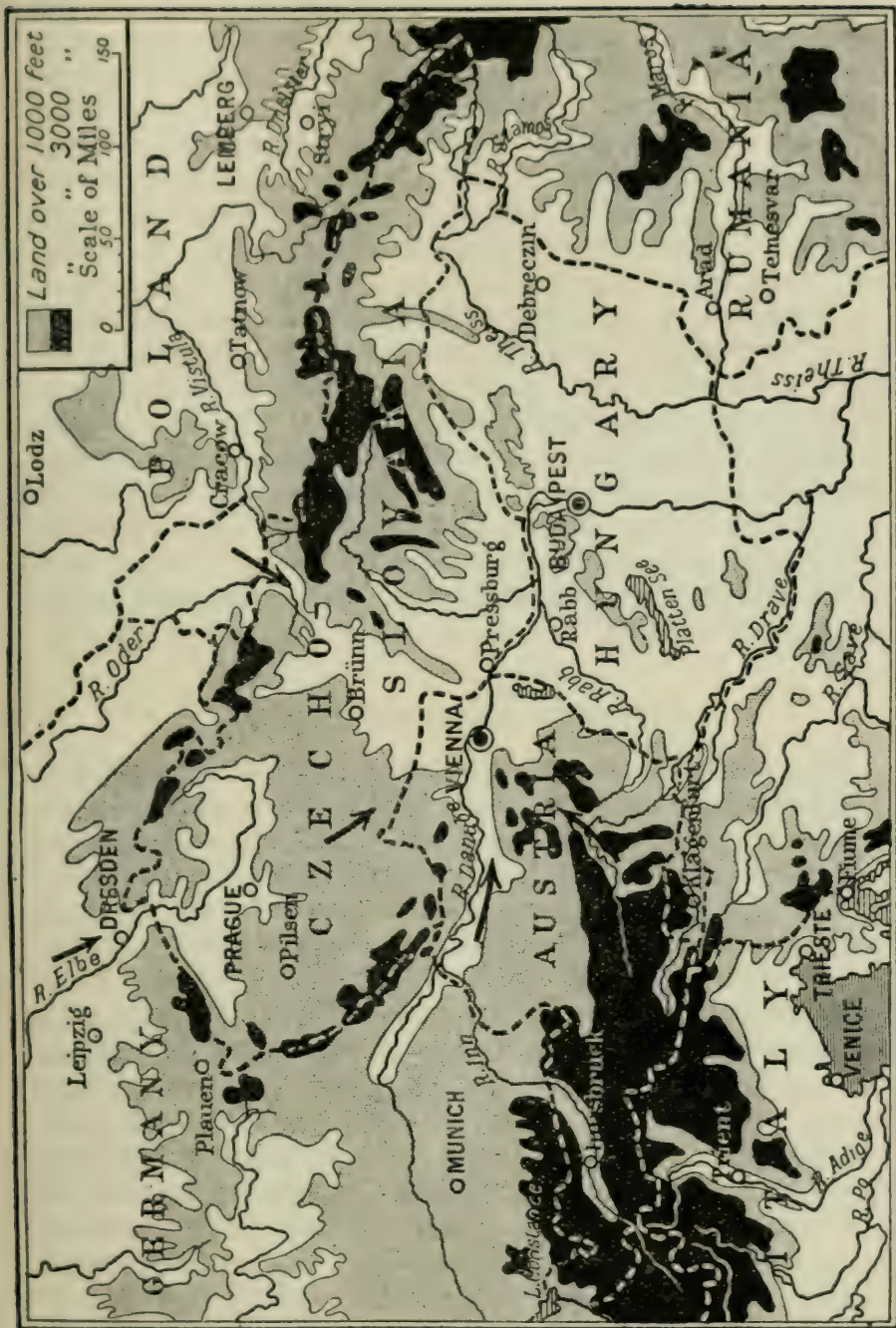
(1) THE BOHEMIAN PLATEAU.

This diamond-shaped plateau is really a basin bordered by highlands (see Fig. 65). It is tilted north-westwards so that it is drained by the head-streams of the Elbe which leaves the country by the famous Elbe Gate.

The climate, which is typical of Central Europe, is very favourable to agriculture, and when we recall that the Bohemian people are mainly Slavs, who are industrious agriculturists, we shall be prepared for the statement that half of the country is tilled. The richest agricultural lands are found in the river valleys and in the northern lowland, where there are considerable areas of rich alluvial, and in some places of volcanic, soil. The chief crops are oats, wheat, barley, beet and hops ; but the summers are sufficiently warm for vines and maize to ripen. In the south the land is rather infertile, and is largely devoted to rye (the chief Bohemian grain crop), potatoes (the staple food of the inhabitants), and to pasture.

All the highlands are forested, and provide not only large quantities of timber, but also pulp for the paper-mills of Pilsen and Prague.

Bohemia is exceedingly rich in minerals, so that it has become one of the chief industrial regions of Central Europe. Coal and iron are mined near *Pilsen* and *Prague*, and are largely used in manufactures based upon the products of the surrounding areas. Thus, both are engaged in brewing (barley and hops), paper-making (pulp), leather-manufacturing (hides from southern pastoral lands), sugar-refining (beet), as well as engineering, and particularly in the making of agricultural implements. Important beds of lignite occur in the north-west, and have aided the growth of many indus-



tries, the best known of which is perhaps the porcelain industry of *Karlsbad*. This is dependent upon the kaolin derived from the granitic rocks found in that district. *Karlsbad* and *Marienbad* are noted for their mineral springs. Coal, found in the north-east, as well as power from mountain streams, is used at *Reichenberg* and other towns at the foot of the *Riesen Gebirge* (= Giant Mountains) for the manufacture of cotton and woollen goods.

Moravia is a smaller counterpart of Bohemia, but its slope is towards the Danube, to which it is drained by the March. The climate and agricultural products resemble those of Bohemia. *Moravia* is also an industrial region. The chief coalfield lies in the north-east, where a portion of the Silesian coalfield (see p. 220) extends into *Moravia*. Many towns are engaged in cotton, wool and iron manufacturing. *Brünn*, the chief city, occupies a central position, and is engaged in all these industries.

(2) THE EASTERN ALPS.

The physical map shows that towards the east the Alps decrease in elevation. The valleys open northwards (*e.g.* the Inn), eastwards (*e.g.* Drave and Save valleys) and southwards (*e.g.* the Adige). The Drave and other valleys opening eastwards to the plain of Hungary have the cold winters experienced on that plain; those opening to the plains of northern Italy enjoy the warmer Italian winters; whilst those opening northwards have a winter climate which may be classified as intermediate between the two. All have very warm summers. The lower altitude of the eastern Alps has the effect of making them more productive than the western Alps, whilst the climatic differences just noted between the different sets of valleys affect the type of crop produced in each. The southern valleys are warm enough for the vine and the mulberry, whilst the eastern and northern valleys are more suited for cereals. In the higher parts agriculture is practically restricted to

the valleys. As in Switzerland the high pastures are important for summer dairy-farming. The mountain forests form a great source of wealth, and large quantities of timber are floated down the east-flowing rivers to the treeless Hungarian plains. In some parts minerals are abundant, and their presence has led to the growth of mining and manufacturing industries at *Eisenerz* and other places in Styria, where lignite is found and iron is mined and smelted; at *Bleiburg* and other towns in Carinthia, where lead works using the local supplies of lead are found; at *Salzburg*, where salt and copper are mined; and at *Idria* in Carniola, where there are deposits of mercury. *Klagenfurt*, in eastern Carinthia, and *Graz*, in eastern Styria, are very important iron-smelting and manufacturing towns. In Voralberg, the province adjoining Switzerland, the abundance of water power and the influence of the Swiss example have led to the rise of cotton manufacturing, whilst in Tirol the manufacture of silk is carried on.

(3) THE HUNGARIAN PLAINS.¹

The plains of the Middle Danube are divided into two unequal portions by the Bakony Wald, at whose foot lies the shallow Balaton or Platten Lake, and an extension of the Carpathians (the Tatra and the Hungarian Ore Mountains), both of which approach the Danube at its great bend. To the north-west lies the Little Plain, to the south-east lies the Great Plain, frequently called the *Pusztas*. The climate is extreme and the rainfall light, so that the natural vegetation is steppe. Formerly pastoral occupations formed the chief pursuits of the Magyar, an Asiatic steppe-land invader, who found himself at home in such a land and spread out throughout its length and breadth, but avoided the highlands. At the present time half of the plains have been ploughed and produce enormous crops of cereals, particularly maize,

¹ It must be noted that the limits of what we here call the Hungarian Plains do not coincide with the frontier of the new Hungary (see Fig. 65).

grown largely for feeding stock, and wheat, so that the region is one of Europe's richest granaries. The vine is widely grown, especially on volcanic soils in the vicinity of *Tokay*, on the upper Theiss. Tobacco and beet are also grown. In the Banat, the south-eastern part of the Great Plain, the summers are hot enough for the production of rice. As in Argentina and in Canada the development of agriculture has been stimulated by the construction of a network of railways radiating from Buda-Pest, the Hungarian capital.

Pastoral occupations and dairy-farming are of great importance and find occupations for large numbers of people. Millions of cattle, horses, sheep and pigs are reared, as well as considerable numbers of goats. *Debreczin*, south of Tokay, is a great horse market.

Manufacturing is little developed except in connection with agriculture, *e.g.* flour-milling, sugar-refining, tobacco-manufacturing and brewing. *Buda-Pest* is an important milling centre.

(4) THE CARPATHIANS AND TRANSYLVANIA.

The folded ranges of the Carpathians extend from the Little Carpathians, which reach the Danube east of Vienna, to the gorges of the Iron Gates, where the Danube leaves Hungary. The system is continued by the Balkans. Transylvania is a plateau shut in by the great bend of the Carpathians on the east and the Bihar Mountains on the west.

The Carpathian ridges are largely composed of sandstone, except in the western extension formed by the Tatra and the Hungarian Ore Mountains, where granite and other older rocks are found. The Bihar Mountains on the western border of Transylvania are also granitic. Both the Carpathians and Transylvania (= beyond the Forest) are forested, and as forestry occupations are scientifically controlled, large quantities of timber are obtained not only for use on the treeless plains, but also for export. Minerals are fairly abundant. Iron and some gold are mined in the Tatra and Hungarian Ore

Mountains, whilst iron, gold, silver and lead are found in the western part of the Transylvanian Alps.



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FIG. 66.—The New Rumania.

(5) THE RUMANIAN PLAINS.

The Rumanian plains of Wallachia, Moldavia and Bessarabia are really a tongue of the Russian plain. They are rich agricultural lands yielding valuable crops of wheat and maize as well as vines and tobacco. The maize is extensively used for fattening cattle and pigs,

for pastoral occupations are very important too. The drainage of the swamp bordering the left bank of the Danube will give much land suitable for dairy-farming.

Along the foothills of the forest-clad Carpathians, especially in the Prahova district north-west of Bukarest, are very rich deposits of salt and petroleum. The Carpathian forests of fir, oak and beech not only support large numbers of pigs, but also supply timber to the treeless plains. The Dobrudja area, which lies south of the Danube delta, is so dry that it is practically semi-desert.

THE NEW DANUBIAN COUNTRIES.

The political map of this part of Central Europe is very different from what it was in 1914. The new units correspond more closely to the distribution of the peoples of the several nationalities, although in every case there are minorities of other nationalities. This is inevitable owing to the complex way in which the peoples are distributed.

The Czecho-Slovak Republic (area 55,000 square miles, population 14 millions).—This new enterprising country includes Bohemia, Moravia, and part of Silesia and Slovakia. These lands are all inhabited by Slavs, and were formerly part of Austria-Hungary. The Czechs of Bohemia and Moravia, lands which we have already seen (see p. 230) contain rich industrial and mining districts, are more advanced than their Slovak kinsmen who are chiefly agriculturists.

The new state has no coastline and therefore no seaport, but she can use the Elbe, the Oder and the Danube, all of which have been internationalized, whilst she may send trains over the Austrian railways to Adriatic ports. The capital, Prague, is destined to become one of the chief cities of Central Europe.

The Austrian Republic (area 30,000 square miles, population about 6 millions).—This small inland country corresponds, roughly, with Austria proper of the old regime. It includes Upper and Lower Austria, lying

along the Danube, and portions of the eastern Alps (see p. 232).¹ The capital is *Vienna*, a city of about two million people, and altogether too large for the new Austria to support, a fact which is having tragic consequences for its inhabitants. The city has a magnificent situation, which may be compared with that of Cologne, since it is situated where the Danube leaves the highlands for the plains, at a point upon which some of the chief routes of Central Europe converge (see Fig. 65). It has important furniture, metal and leather industries.

Most of the inhabitants of the new Austria are Germans.

The Hungarian Republic (area 45,000 square miles, population about 8 millions).—The new Hungary is chiefly the middle plain of the Danube, whose centre is Buda-Pest, the capital (see p. 234 and Fig. 65). The lands which have been retained are practically those in which Magyars form the bulk of the people. Hungary is thus, on the whole, a rich pastoral and agricultural country. Both Austria and Hungary are now entirely inland states, but the peace treaties give to both the right of freedom of access to the Adriatic ports of the former Austro-Hungarian Empire.

Rumania (area about 112,000 square miles, population about 13 millions).—This country is now twice its pre-war size. It has received Transylvania, Bukowina, Bessarabia and half of the Banat. These territories, together with old Rumania (chiefly the Wallachian and Moldavian plains), make up a country of rich and varied natural resources, in which corn, minerals, oil and timber predominate (see pp. 235 and 236).

If the new country can be consolidated it will undoubtedly become one of the chief powers of Central Europe. It contains minorities of many nationalities (Jews, Germans, Magyars, etc.), all of whom are specially protected by treaty.

Bucharest, the capital, has a central position in the

¹ A plebiscite has to be taken in the Klagenfurt area.

Wallachian plain. This gives it a good site for the command of routes from the Banat via the Iron Gate, from Transylvania via the Carpathian passes, from southern Russia and from the port of Constanza. *Galatz* and *Braila* are important river ports at the head of the Danube delta.

CENTRAL EUROPE: SWITZERLAND.

PHYSICAL FEATURES.

A study of a physical map will show that Switzerland readily falls into three physical regions: (i) The Juras, (ii) the Alps, and (iii) the Central Plateau.

(i) *The Juras*.—These mountains, which lie on the Franco-Swiss frontier, are a series of parallel folds of limestone, whose tops have been flattened by denudation. The troughs between the upfolds form longitudinal valleys in which communication is easy in the direction of the main axis, *i.e.* from north-east to south-west, but difficult at right angles to the valleys, *i.e.* from north-west to south-east. Being composed of limestone, many parts of the Juras exhibit karst characteristics, with which we are already familiar. In other parts they are forested, whilst in others cultivation extends to the summits.

(ii) *The Alps*.—These mountains are great folds of the earth's crust, probably caused by thrusts from the south-east which caused the rocks to buckle, crumple, or fold, and since the ancient plateau core of central France on the west, and of similar areas to the north, acted as centres of resistance, the folds were compelled to assume their graceful sweep from Genoa to Vienna. The highest central ridges are composed of old, hard, crystalline rocks, *e.g.* granite, which make imposing ridges and peaks; but younger sedimentary rocks, *e.g.* limestone, appear on the flanks of the older rocks. It is worthy of note that where the Alps are highest, *i.e.* in the region of Mont Blanc, they are narrowest, whilst

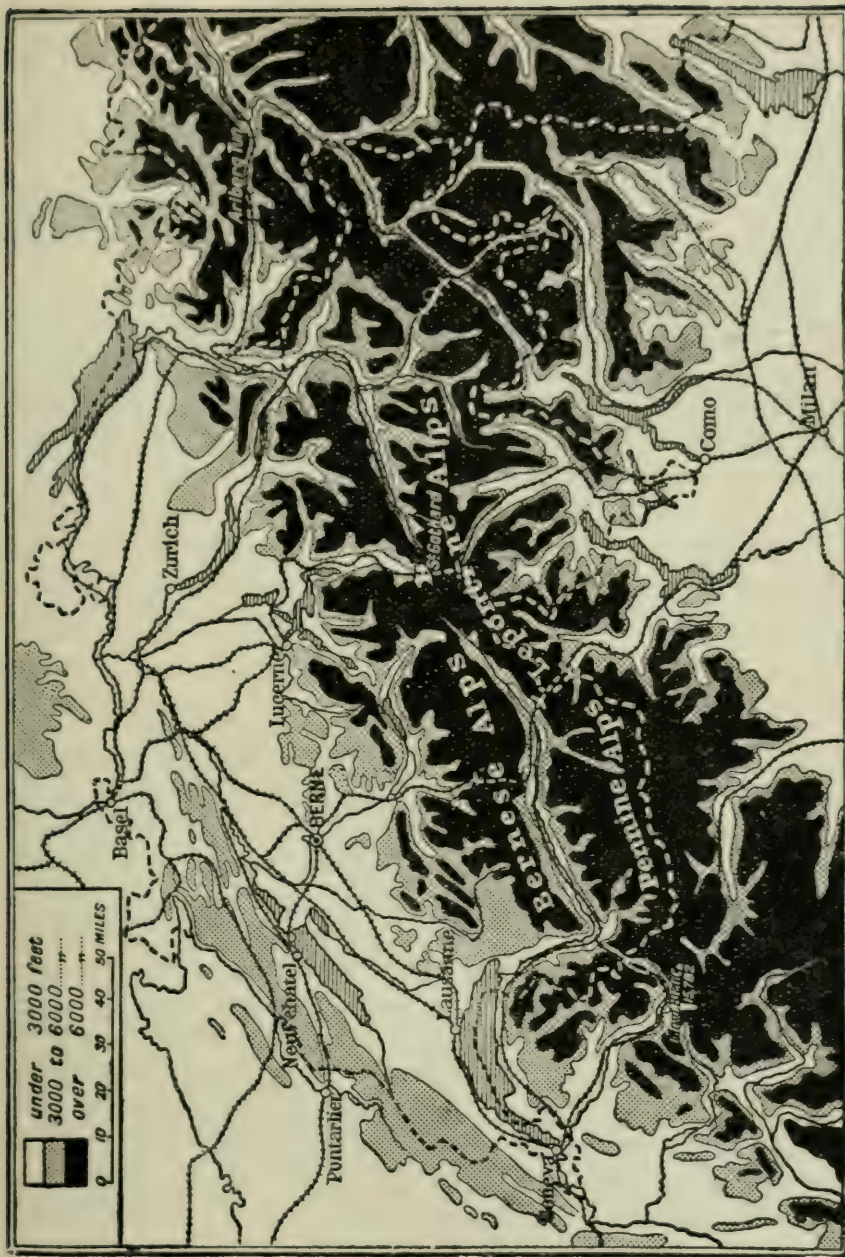


FIG. 67.—Switzerland. Relief and Routes.

towards the east where they are lowest they are also widest.

Most of the Alpine lakes are located where the valleys open from the mountains. Thus along the northern margins are Zug, Lucerne and Thun, and in a similar position in the south, Maggiore, Lugano, Como and Garda. All these lakes are long and narrow and fill moraine dammed valleys, which formerly contained glaciers.

(iii) *The Central Plateau.*—On their southern margins the Alps rise abruptly from the plain of Lombardy, but to the north they give way to a plateau foreland stretching from south-west to north-east. This plateau, whose altitude varies from 1,000 to 3,000 feet, is largely composed of sandstone and is not very fertile, except where there are glacial or loess deposits. The general slope is indicated by the direction taken by the rivers (Aar, Reuss, etc.), which flow north-westwards to the base of the Juras, where they unite to form the Aar.

CLIMATE.

For every 300 feet of ascent the temperature falls about 1° F., so that in a country whose altitude varies from about 600 feet in some of the southern valleys to over 15,000 feet in the highest peaks, and whose average elevation is about the height of the top of Snowdon, this factor will be very important. But other factors modify the influence of elevation. For example, the slope of the land to or from the sun, especially in the valleys, is often sufficient to have an effect equal to that of many degrees of latitude. Again, the presence of large lakes affects their immediate neighbourhood very considerably, whilst valleys show appreciable differences according to the direction in which they open: *e.g.* valleys opening southwards are much warmer than those opening eastwards or northwards. The occasional hot *föhn* winds should also be noted. They are most commonly experienced in those valleys which open to the north.

As regards rainfall, too, the chief factor is elevation, but it must be remembered that beyond a certain altitude (about 6,500 feet in the Alps) the amount of the fall decreases owing to the exhaustion of the water vapour of the atmosphere. The position of the snow-line depends upon altitude, the summer temperature, and the amount of rainfall. It is lower on the northern than on the southern slopes, and on both slopes is lower in the wetter west than in the drier east, whilst some of the valleys are so sheltered that cultivation depends upon irrigation. The plateau, owing to its more uniform elevation, has an evenly distributed rainfall, although there is a distinct "rain shadow" to the lee of the Jura Mountains.

CHIEF INDUSTRIES.

Pastoral Occupations.—Sheep-rearing is not very important. Cattle are chiefly reared on the pastures of the Alpine foreland, but they are also found in the Alpine section. There, they spend the winter in the valleys, but in spring they are driven to the high mountain pastures—the alp—where they stay until the end of summer. Much more milk is produced than is necessary to supply the needs of the inhabitants, so that the surplus is manufactured into cheese (*e.g.* the noted Gruyère), into milk chocolate, or is condensed. These articles form very important exports. In addition, the manufacture of leather, and particularly of kid and morocco leather from goat-skins, is another example of a manufacturing industry related to the keeping of animals.

Agriculture.—The cultivated areas are mainly in the Alpine foreland or in the valleys. Rye, oats, wheat and potatoes are the chief crops; but in the sheltered valleys the vine can be cultivated, *e.g.* on the sunny, south-eastern slopes of the Jura, whilst in the warmer southern valleys, *e.g.* the valley of the Ticino, the cultivation of maize, mulberries, and even of olives betokens the approach to the Mediterranean region.

Forestry.—The Swiss forests are under Government supervision, and great care is taken that the area of forest is not diminished. On the Alpine foreland beeches predominate; in the forests which clothe the lower and middle slopes of the Alps, conifers form the chief trees; but in the southern valleys, oaks and chestnuts are most common.

Manufactures.—It is remarkable that, although situated in the heart of Europe with no outlet to the sea, having to receive her imports from abroad through the ports of other countries, and having very little mineral wealth, especially of coal and iron, the manufactured products of Switzerland are found in every country of the world. Most of the manufactures began as home industries, which have been developed, partly by the presence of great reserves of water power, which make electricity the cheapest motive and lighting power in the country, and partly by the efficient technical education which has increased the skill of the people themselves. As both coal and raw materials have to be imported, it follows that the Swiss, like the people of the New England States in North America, adapt their work to the production of those articles which require the application of a great deal of skill to a small amount of raw material—*e. g.* watches, clocks and musical-boxes.

Watches and clocks are chiefly made in towns lying along the base of the Juras, *e. g.* Geneva, Chaux-de-Fonds and Neuchâtel. *Cotton goods*, especially embroidery, and *silk goods* are largely manufactured in the towns lying along the northern base of the Alps, *e. g.* Zürich, Berne and St. Gallen, but also at Basel. *Zürich*, the largest town in Switzerland, is the chief manufacturing centre.

"The Playground of Europe."—The natural beauties of Switzerland are so great that every year thousands of tourists from all parts of Europe, and even from farther afield, visit the country. Any consideration of the chief industries of Switzerland would, therefore, be incomplete without some reference to those who find

employment in hotels, on carriages, railways, or lake steamboats, or as guides. It has been very truly said that the magnificent scenery of the Alps is a commercial asset which yields a very profitable return.

COMMUNICATIONS.

The central position of Switzerland, together with the fact that it is in close contact with four of the chief European States (France, Germany, Austria and Italy), has led to the country becoming an important international clearing-house. Thus, the headquarters of the International Labour Bureau, the International Railway Administration, the International Postal Union and the United Telegraph Administration, the great clearing-house of the Geneva Red Cross Society, and last, but chief in importance, the Headquarters of the League of Nations, are all located there.

Of the internal communications the 3,500 miles of state-owned railways are of chief importance. There are also many light railways, by means of which steep mountain slopes, such as those of the Rigi and Pilatus, both near Lucerne, can be overcome with ease by those who do not desire to go on foot, while in those mountain districts not reached by railways the usual method of communication is by *diligences*, which are coaches drawn by horses.

Switzerland lies between south Germany on the one hand and Italy and the Mediterranean ports on the other, so that north and south routes have to negotiate the Alpine ridges, which run roughly at right angles to the direction of the routes. But the Alps, unlike the Pyrenees, are notched by deeply cut cols and passes, and since the upper valleys of rivers usually lead to these, the real difficulty normally consists of cutting a tunnel below the level of the pass itself. The chief route between western Germany and the Mediterranean crosses the Alpine foreland to Lucerne, afterwards passing along the upper valley of the Reuss to Göschenen. From this town to Airolo on the southern

side of the mountain mass, the railway passes through a tunnel, whose length is nearly 10 miles and whose height above sea-level is a little less than 3,800 feet. The road, the first to cross the Alps, follows the pass and picks up the railway once more at Airolo. From this town the valley of the Ticino gives the means of making the descent on the southern side, and of finally reaching Milan via the lakes of Lugano and Como (see Fig. 67).

Several railways from France (the chief is the Paris-Dijon-Pontarlier line) cross the Juras and converge upon Berne, the Swiss capital, which stands on the Aar in a very central position for communications with all parts of the plateau. From Berne another Trans-Alpine railway reaches Milan and the Mediterranean, and is a great rival of the Gothard route. The new Lötschberg Tunnel through the Bernese Oberland enables the line to reach Brieg, on the upper Rhone, whilst the Simplon Tunnel ($12\frac{1}{4}$ miles long) gives access to the valley of the Toce, which leads the route along the shores of Lake Maggiore to Milan (see Fig. 67).

The chief east and west connections are those which utilise the Arlberg Tunnel as a link between the railways of the plateau, where lines run in all directions, and the Austrian lines converging upon Innsbruck, and those making use of the great longitudinal valleys of the upper Rhone and Rhine.

THE PEOPLE.

The mountainous nature of the country has greatly aided the Swiss in the fight for the preservation of their independence. It has also been responsible for the preservation of links with the past. Thus, in some of the less accessible districts, *e. g.* in the canton of Graubünden, which includes the upper feeders of the Rhine, there are some 40,000 people who speak Roumansch, a distinct Latin dialect. The people are largely of the Alpine race, but other races are also found, for on the fall of the Roman Empire the north was over-run by German

tribes, whilst in the south Italians have pressed along the river valleys, *e.g.* the Ticino, even as far as the watershed. There is no Swiss language. About two-thirds of the people speak German, the majority of the remainder speak French, and only about one-twelfth Italian. The German-speaking inhabitants naturally live in the north, the French-speaking ones in the west, and the Italian-speaking people in the south. The proportion of each is an indication of the distribution of the population, for the majority of the people live in the central plateau, especially in the manufacturing zone extending from Berne to Lake Constance. In the Alpine region the largest centres can only be described as large villages which are chiefly dependent upon the tourist trade.

Despite the differences of language, race and creed, the Swiss are very homogeneous, and there is little or no antagonism between the different peoples.

THE MEDITERRANEAN LANDS.

The Mediterranean Sea is much larger than the Baltic and lies in warmer latitudes. It has high coastal margins, particularly in the north, where an almost continuous mountain wall protects it from the cold north winds, whilst the Baltic shorelands are plains which expose that sea to cold winter winds. The Mediterranean is exceedingly deep, whilst the Baltic is shallow. Far more evaporation takes place in the Mediterranean area than in the Baltic area, and this coupled with the fact that the latter receives more fresh water from its rivers than is lost by evaporation, while the opposite is the case in the Mediterranean, not only makes the Baltic waters very brackish and those of the Mediterranean above the normal in salinity, but sets up surface currents flowing *out* of the Baltic, but *into* the Mediterranean. The higher latitudes and the lower salinity of the Baltic also cause that sea to freeze very readily in winter. Both seas have small tides, owing to the narrowness of

their entrances. In the open Mediterranean the rise and fall is often less than one foot, but at Venice, at the head of the Adriatic, it reaches about three feet. These conditions are very suitable for the formation of deltas, which are found at the mouths of all the chief Mediterranean rivers. Since harbours built upon deltas readily become silted, Mediterranean ports are not placed at the mouths of rivers, but a little to one side.

THE WESTERN BASIN.

The western basin of the Mediterranean is surrounded by an almost unbroken wall of mountains. It is, therefore, important to notice the breaks, or gaps, since they will be the great gateways to the basin. In the west there is the Strait of Gibraltar, only nine miles wide, commanded by the great British rock fortress of Gibraltar, the "Key to the Mediterranean." Two other sea gateways are on either side of Sicily, the broad Strait of Sicily to the south, and the narrow Strait of Messina to the north. The command of these straits, which give communication between the two Mediterranean basins, has always given the island of Sicily great strategic importance. The positions of the ancient city of Carthage, near Tunis, of the modern French naval station of Bizerta, and of the fortified British island of Malta, all emphasize the importance of these gateways. Only two lowland gateways break the mountain wall, and both of these are in the south of France, the Gap of Carcassonne, between the central plateau and the Pyrenees, and the narrow Rhone valley, between the central plateau and the Alps.

THE EASTERN BASIN.

The eastern is the larger of the two basins, and it lies further south. The mountain barrier is not continuous in the north, and in the south is practically absent. The most important gateway is that formed by the construction of the Suez Canal, which gives an eastern outlet

via the Red Sea to the Indian Ocean and the Far East. Another historic gate is reached by following the Persian



FIG. 68.—The Mediterranean and its Gateways.

Gulf and the plains of Mesopotamia to Aleppo which commands it. The Bosphorus, the Sea of Marmora and the Dardanelles form a gateway from the Black Sea. Salonika commands a fourth route which reaches the

Ægean Sea via the Morava and Vardar valleys, whilst at the head of the long and narrow Adriatic are Venice, Trieste and Fiume, the termini of railway routes, all of which must cross mountain barriers before reaching the sea. In addition to these the Straits of Sicily and Messina are sea gateways leading from the western basin. In modern times, the eastern basin is of less importance than the western basin, owing to the character of lands which lie along its shores.

CLIMATE AND PRODUCTS.

The lands bordering the Mediterranean have the Mediterranean type of climate, except where the Sahara reaches the sea along the southern margins of the eastern basin. The products are also "Mediterranean" in type. We have noted the chief physical differences between the Mediterranean and the Baltic. The difference between their climates is responsible for the differences between their products. "Mediterranean trade" is largely in wines, fruits and silks; "Baltic trade" is chiefly associated with cool temperate forest products (timber, pulp, resin, etc.), dairy produce, hemp, flax, etc.

BRIEF HISTORICAL NOTES.

The Mediterranean region has had a remarkable history, especially with regard to the early civilizations which flourished along its shores. Egypt, of course, owed its importance to the Nile. Phœnicia grew up along the Syrian coast, where the great routes between Egypt and Babylon touch the sea, and its people were compelled to go upon the sea owing to the fact that their land was too poor to support them by agriculture alone. As Phœnicia grew in power, colonies were founded, of which Carthage, the most important, gave them the command of the straits between the two basins. Later the Greeks became a great maritime power, and, like the Phœnicians, founded colonies of which Marseilles and

Alexandria were the chief. The Greeks and the Phœnicians perforce came into conflict and fought for the possession of the key island of Sicily; but ere the struggle was decided, Rome, a new power, appeared on the scene, and she had the great advantage of occupying a central position from which she could carry out enterprises in both basins. Rome and Carthage struggled for supremacy, and the fall of Carthage left Rome in supreme possession of the commanding straits. The Roman Empire grew rapidly, and conquest followed all the natural routes leading from both basins, so that in time the Mediterranean Sea was the centre of a vast empire, and Rome was the mistress of the world. Later, the founding of a second capital, Constantinople, contributed to the decay of the empire, and Rome lost her power. The next great Mediterranean empire was that of the Arabs or Saracens, who spread from Asia to Africa and thence along the north coast of that continent to the Atlas region, finally overflowing to the Iberian Peninsula. They also occupied the eastern shores of the Mediterranean from which the Crusaders failed to dislodge them. Even to-day the eastern and southern shores of the Mediterranean are Mohammedan, whilst in the Iberian Peninsula they have left indelible traces of their long occupation. It is owing to these Mohammedan conquests that there came a separation between north and south shores of the sea. But we must not forget that geographically the two shores form part of one region and cannot be separated.

The Crusades fostered trade between East and West, and during the middle ages Alexandria, Venice and Genoa grew rich upon the profits of this trade. But the Turkish fifteenth-century conquests in the eastern basin interrupted these trading relations, which later received a severe blow when the new route to the east was discovered by Vasco da Gama. The nineteenth century, however, saw the cutting of Alpine tunnels and the construction of the Suez Canal; and once more the Mediterranean became the highway to the East, and Venice and Genoa revived their former greatness. To

Britain, this great highway to the East is of vast importance, for it is the shortest route to her Indian and Australian possessions.

THE MEDITERRANEAN LANDS: THE IBERIAN PENINSULA.

PHYSICAL FEATURES.

Three-quarters of the peninsula consists of the Meseta, an ancient, tilted, plateau block, and this is why the peninsula is so compact in shape. Against this massif we have the folded Cantabrians and Pyrenees in the north, and the Sierra Nevadas in the south-east (see Fig. 47). Owing to its structure, the coasts of the Iberian Peninsula are steep and wall-like, and have very few good harbours. The plains are comparatively small and are separated by wide tracts of highland. They are chiefly in the valleys of the Guadalquivir and the Ebro, and along the west coast. Like the Balkans, the Iberian Peninsula forms a link or bridge between Europe and another continent; but the great barrier of the Pyrenees, the plateau character of the peninsula, and the fact that the bridge soon leads to the Sahara desert, whilst the Balkan bridge leads to Mesopotamia and the Indian Ocean, render the Iberian link of less value than the Balkan, and also give the Iberian railways a local rather than an international importance.

CLIMATE.

As with relief, so with climate, the great factor is the plateau character of the peninsula, for although surrounded by sea, the influence of the latter is restricted to comparatively small areas chiefly in the west and north-west. In the north, the Cantabrian-Pyrenees belt, the climatic conditions are those of the West European type of climate, but elsewhere the dry summers and wet winters betoken the Mediterranean type of climate,

but the actual amount of rain received, as well as the seasonal distribution of temperature, varies so much, owing to differences of position and relief, that for our more detailed study it is impossible to consider the whole under one heading.

THE IBERIAN RIVERS.

In the first place it will be noticed that the main watershed is situated far to the east of the peninsula. This means that the long slope of the plateau is west-

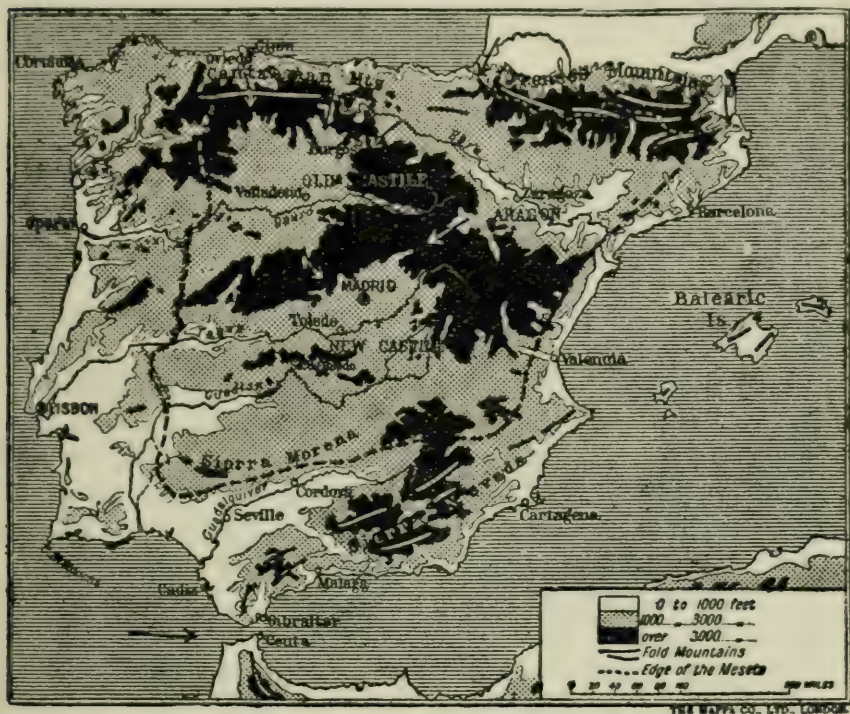


FIG. 69.—The Iberian Peninsula.

wards, is away from Italy, and that the longest rivers will flow in that direction—*e.g.* the Tagus. It should also be expected that most Iberian rivers will have rapids, falls, or gorges at no great distance from the sea. In the case of those rivers having their lower courses in Portugal, *e.g.* Tagus, these interruptions occur approximately at the Portuguese frontier, which roughly

coincides with the edge of the Meseta. The two rivers of the north-west, the Minho and the Douro, carry most water to the sea because they are fed from the Cantabrians, which receive rains all the year round. Plateau rivers like the Tagus and the Guadiana have cut steep, cañon-like valleys, which are mere gashes in the dry plateau. Their volumes vary very considerably with the season, and in summer they are frequently almost dry. Their Meseta courses are, therefore, of little or no value for navigation, whilst their value for irrigation is lessened by the depth of the valleys, which renders it very difficult and expensive to raise water to the plateau level.

NATURAL REGIONS.

Before describing the leading characteristics of the natural regions of Spain and Portugal let us turn very briefly to the following question: "Why should there be two countries in the Iberian Peninsula?" The causes are partly geographical and partly historical. The international frontier roughly coincides with the western edge of the plateau-block of the Meseta, so that, as we have already seen, the rivers are interrupted by falls and gorges where they leave Spain for Portugal, and whilst their Spanish portions are not navigable, the limit of navigability is at or near the Spanish frontier. Portugal is well watered, and the Meseta is poorly watered, and the limit of reasonable rainfall is approximately the international frontier. The results of this are seen in the natural vegetation, the forests and rich pastures of Portugal being in striking contrast to the steppe of the western Meseta. The temperature differences between the two regions are also well marked. Thus, it is seen that Portugal is geographically different from those parts of Spain lying along her eastern frontier.

In the eighth century Mohammedan invaders from Morocco entered the peninsula by its natural southern gateway—the plain of the Guadalquivir—and gradually pressed in all directions until they had reduced the

whole, except for a few strongholds in the Cantabrian mountains. From these centres of resistance the Moors were, little by little, driven southwards until in 1492 they were finally defeated at Granada. During the centuries that were occupied in this task, first one unit and then another obtained its freedom. Portugal was free from the Moors long before they were finally cleared from the rest of the peninsula, and, owing to the geographical factors we have already considered, was least able of all the Iberian States to co-operate very effectively with the struggle on the plateau. The country had thus the opportunity to organize and to consolidate as a separate political unit.

(I) THE MESETA.

The Meseta is a low plateau crossed by higher ridges, of which the chief are the Sierra de Guadarrama, separating the plateau basin of Old Castile from that of New Castile, and the Sierra Morena, which forms the southern edge. The climate is marked by extremes of temperature and by drought, so that the sierra ridges are very bare, and much of the plateau surface is poor steppe. Pastoral occupations are, therefore, carried on, and more than one-half of the sheep in the peninsula are pastured there. The famous merino sheep, which were introduced by the Moors, were formerly of much greater importance than they are to-day. Extensive areas in the upper Douro and Tagus valleys have been brought under cultivation by means of irrigation, and much wheat is now grown, especially in the region around *Valladolid* which is called the "Granary of Spain." The vine is widespread. Many parts of the Meseta are rich in minerals, but comparatively little has been done to develop this source of wealth, except in the Sierra Morena, where the famous Rio Tinto copper mines, which produce the greater part of the Spanish output (port, Huelva), and the Almaden quicksilver mines are found. The first lies to the south, the second to the north of the mountains.

Iron is also mined at Leon, south of the western Cantabrians.

Madrid, the capital of Spain, has no other advantage of site beyond the fact that its central position has made it the meeting-place of routes which come from all parts of the plateau. The surrounding country is bare and dry, and the climate is very trying. *Toledo*, the old capital, stands on the Tagus, south-west of Madrid.

(2) THE PLAINS OF THE GUADALQUIVIR AND THE EBRO.

These plains are the chief lowland areas of Spain. The valley of the Guadalquivir—the plain of Andalusia—is much more fertile and enjoys a better climate than the enclosed Ebro plain, where there are extremes of temperature and a deficient rainfall. But even in the better watered Andalusian plain irrigation is necessary.

Saragossa, the chief town on the Ebro, lies in the centre of an irrigated region producing olives, vines, tobacco and cereals, but not oranges and lemons, as the winters are too cold for these fruits. The town has sugar-refineries and manufactures iron and steel.

Seville is the chief city of Andalusia, where the fertile soil and the warm climate combine to produce all the Mediterranean fruits, cereals, and tobacco, as well as to make the Andalusian the rich, easy-going, merry person who so often is the wit of the Spanish drama. The city stands at the head of the ocean navigation of the river, and has largely superseded Cadiz as the outlet for the exports of Andalusia. It exports large quantities of Mediterranean products, particularly oranges, and has various industries, including the manufacture of iron, obtained in the Sierra Nevada. *Cadiz*, a fortified port founded by the Carthaginians, exports fruits, wines (especially sherry from Xeres) and salt, which is obtained by the evaporation of sea-water.

(3) THE NORTHERN RANGES.

The Pyrenees separate France from Spain. Like the

Alps they are folded mountains, but they present a more difficult barrier to communications than the Alps and they are crossed by very few roads. This is because of the uniform height of their ridges. There are, of course, cols and passes, but they are seldom more than 1,000 feet below the level of the peaks. All railway communications between France and Spain must, therefore, pass round the ends of the Pyrenees. From the purely economic standpoint the Pyrenees are of little value. The few inhabitants are engaged in forestry industries and in pastoral pursuits. The tiny republic of Andorra (area, 175 square miles ; population, 5,250) is under the joint suzerainty of France and the Spanish Bishop of Urgel.

The Cantabrians is one of the richest parts of Spain. This is partly due to the climate, which is West European in type so that there is no lack of water, whilst the temperature conditions do not, as in other parts of Spain, make it difficult to put forth the maximum of energy during the summer. It is also partly due to the very rich, mineral deposits which the mountains contain, as well as to the valuable forests. The presence of a strong, energetic Basque population is also a great asset in the economic development of the region. Two-thirds of the total output of Spanish coal comes from the district of *Oviedo* in the Asturias. This important town commands the route via Leon, which we have already noted as an iron-mining centre, to *Gijon*, the port. Large quantities of iron ore of the very best quality are mined in the Cantabrians, and a certain amount is smelted at *Bilbao* and *Santander*, but more is exported, especially to the smelting towns of South Wales. The western Cantabrians and Galicia are noted for cork, obtained from the bark of the cork oak. Galicia, as may be expected from its indented coast and the numerous rias, is the only part of the peninsula supporting a considerable fishing population. *Corunna* and *Vigo* are the chief Galician ports, and both are engaged in sardine fishing and packing. *Ferrol* is a naval station.

(4) PORTUGAL.

The equable distribution of temperature, the abundant rainfall and the rich soil give to Portugal splendid opportunities of becoming a rich agricultural and pastoral country. The land is also rich in minerals, especially in copper and iron. Apart from a few coastal districts which have long been in contact with other countries, and have more energetic inhabitants than are found in the interior, the natural wealth of the country is very neglected. Even in agricultural products Portugal is not self-supporting, whilst the methods employed on the farms are often most antiquated. It is true that her forests supply one-half of the world's output of cork, but in many parts, particularly in the south, they are chiefly of value for the rearing of pigs, which can be fed on acorns. Except for wolfram, collected from the surface of the land in the north, and for a comparatively small amount of iron and copper obtained in the southern provinces, the exploitation of the mineral wealth has scarcely begun. The main roads, except in the immediate vicinity of Lisbon and Oporto, are very poor indeed and hamper transport. Forty-three per cent. of the country is actually uncultivated, whilst the education of the people is in a most backward condition.

Lisbon, the capital, is the chief port of southern Portugal. The city stands on the north bank of the bottle-shaped estuary of the Tagus. Its chief trade is in cork, fruit, and the produce of the Portuguese African colonies, *e.g.* rubber and cacao. *Oporto*, at the mouth of the Douro, is the outlet of a rich wine-producing region.

(5) THE MEDITERRANEAN MARGINS.

This region is the most typical "Mediterranean" region in the peninsula—*i.e.* it has very warm summers, mild winters, and practically the whole of its rainfall during the winter months. Unfortunately, however, the rainfall is deficient in amount, and it is necessary to use irrigation methods. Many of the irrigated areas, called

huertas, were made by the Moors, who paid great attention to terracing and irrigation. The long, dry summers are suited to softer fruits, and also permit the ripened fruit to be dried in the sun. Therefore the Mediterranean margins, and particularly the famous *huertas* of Valencia and Murcia, produce mulberries, vines, oranges, lemons, figs, peaches, apricots, pomegranates, and even some cotton, sugar and rice. Malaga, Cartagena, Alicante, Valencia and Barcelona are all engaged in the fruit and wine trade. Silk goods are manufactured at Murcia and at Valencia.

Iron ore is mined in the Sierra Nevada, which now produces about one-third of the Spanish output, and is exported from Seville, Almeria and Cartagena. Copper and other minerals are also found, but are not as important as iron.

Barcelona, the chief port of Spain, is almost as big a city as Madrid. It is in Catalonia, whose people are so industrious that the easy-going people of southern Spain say that the Catalan will get blood out of a stone. It is partly on this account that Barcelona is the chief industrial centre in the country. Besides exporting the wines, fruits and nuts of the country districts, it and other neighbouring towns are engaged in the manufacture of textiles, particularly cotton.

The Balearic Islands stand above an eastern submerged prolongation of the Sierra Nevada. The chief town, Palma, is on Majorca. Minorca for a time belonged to England.

GIBRALTAR.

The famous fortified Rock of Gibraltar is three miles long from north to south, three-quarters of a mile wide, and a quarter of a mile high. On the north side it drops very steeply to a low and narrow isthmus, which connects it to the mainland, and across which a strip of neutral territory separates the Rock from Spain proper. It is not merely a fortress commanding the western gate of the Mediterranean, it is also a great port, for

the construction of moles, the provision of cold storage accommodation, and the enormous supplies of coal maintained there, have made it at once a commercial and a naval harbour of first-class importance. Gibraltar has been British since 1704.

CHIEF COMMUNICATIONS.

Within the peninsula itself the great obstacles are the plateau edges and the east and west mountain ridges rising above the general plateau level. The difficulty is also increased by the character of the river valleys. One other point to notice is, that the bulk of the people live along the sea coasts, so that the construction of the plateau railways (which made Madrid the centre of the whole system) was delayed owing to great cost and the uncertainty as to adequate revenue.

The route from south-west France passes through San Sebastian and crosses by a low pass to the valley of the upper Ebro, from which it passes to Burgos by means of the Pass of Pancorbo. Leaving Valladolid the line crosses the Sierra de Guadarrama and then descends to Madrid. The line which rounds the eastern end of the Pyrenees first follows the coast via Barcelona, then the Ebro to Saragossa, and finally crosses the very difficult barrier of the main watershed of the peninsula. The east coast, from the French frontier to Cartagena, is followed by a line which, except at the prominence ending in Cape Nao, keeps to the very narrow coastal plain the whole of the journey.

Conclusion.—In Spain and Portugal we have examples of countries with great histories which have in modern times sunk to second- or third-rate Powers. Indeed it has been stated that the glamour of the past makes the Spaniard and the Portuguese indifferent to the realities of the present. Of course the climate is against the putting forth of great energy, and the infertility of large tracts, as well as the lack of rainfall in the centre and east, give some excuse for the Spaniard if not so much for the Portuguese. Both Spain and Portugal have

suffered, and are still suffering, from the lack of good roads. Even the recent development in railway construction—the first railway across the east and west ridges was only completed in 1890—has been diminished in value owing to the fact that through-running to and from France is rendered impossible because the Spanish gauge differs from that of France. This has a certain military value, but the “break of bulk” which it causes is detrimental to commercial relationships.

Spain has suffered in recent years owing to the loss of Cuba, Porto Rico and the Philippines, which were practically the last of her former enormous empire in the New World and elsewhere. Her fall from greatness is a long story. It was bad for Spain to gain her New World empire and its great mineral wealth with comparatively little effort. It was disastrous that the home industries—introduced, fostered and perfected by the Moors—should have been neglected. Disunion at home and rebellious colonists abroad shattered the great empire, and to-day their sea-exploits of the age of discovery appear to have been simply a temporary outburst on the part of a people whose land is essentially continental and non-oceanic.

THE MEDITERRANEAN LANDS: ITALY.

PHYSICAL FEATURES AND CLIMATE.

The relief of Italy is very simple. The country is made up of: (i) Portions of the southern Alps, (ii) the great alluvial plain of Lombardy, (iii) the long and narrow peninsula which, with Sicily, is largely the folded Apennines and their slopes, and (iv) the island of Sardinia, which, like the French island of Corsica, is a remnant of an ancient crustal block.

In peninsular and insular Italy the climate is typically Mediterranean, but the plain of Lombardy and the Alpine areas have the more extreme climate associated with continental areas. It is, therefore, only necessary

to divide Italy into two natural regions: Continental Italy and Peninsular and Insular Italy.

In Italy we have many splendid examples of the influence of shelter given by mountain ranges. In peninsular Italy the west is wetter than the east, since the rain-bearing winds are the winter westerlies. The east is also exposed to the cold *bora* winds from the north-east, from which the west is sheltered by the Apennines. The plain of Lombardy is enclosed by mountains except on the east. It is subject to cold winter winds from the Alps, whilst the Apennines prevent it from receiving the benefit of the warm westerlies. On the other hand it has frequent *föhn* winds, which partly account for the cultivation of rice and cotton.

Italy—especially peninsular Italy—is famed for its sunny skies. The cloudy days come in winter, when the rain falls. The influence of the sunny climate is seen in the extensive development of outdoor life, as well as in the preservation of ancient buildings and monuments.

The Italian malaria problem is also bound up with the climate, but also with history. The deforestation of large areas of the Apennines resulted in the exposure of the soil, and its consequent removal to the delta or the plains of the lower valley of some river. This, in addition to the deltaic material which would accumulate in any case, owing to the almost tideless character of the Mediterranean, gives extensive marshy lowland tracts. The most famous are the Maremma, south of the mouth of the Arno, the Campagna, at the mouth of the Tiber, the Pontine marshes, north of Naples, and the extensive marshes of the Po delta. Better drainage and the planting of trees, notably the Australian eucalyptus, are lessening the danger and bringing valuable land under cultivation.

CONTINENTAL ITALY.

This consists of (i) the Southern Alps, (ii) the Plain of Lombardy.

The Southern Alps.—As a result of the Great War Italy has very considerably increased her Alpine territories. Broadly speaking the new "Trentino" boundary is the watershed between the feeders of the Adige and those of the Drave and the Inn (see Figs. 65 and 70). Italy also gains the peninsula of Istria and the coast-land province which includes the port of Trieste. The exact boundary has not yet been determined.

In these Alpine provinces of Italy economic activity is practically confined to the lower slopes of the mountains and to the valleys, many of which are partly occupied by lakes. All are important as means of communication, and six of them are followed by Trans-Alpine railways. These should be found in an atlas, and the importance of Turin, Milan, Verona and Udine noted in connection with them.

Vines, olives, mulberries and maize are cultivated in gardens and on terraced slopes. The valley and hill pastures support pastoral occupations, whilst the mountain forests encourage the lumbering industry. Some iron is found and smelted, and some silk is manufactured, whilst the large number of waterfalls provides a source of power of great value in a coalless country.

The Plain of Lombardy.—This region offers a splendid example of an alluvial plain. One great disadvantage of the Po, a drawback common to most rivers of its type—*e.g.* the lower Mississippi—is that in its plain course it is constantly dropping silt upon its bed, so that it flows on a self-created ridge which is higher than the level of the surrounding plain. The river has thus to be kept in bounds by great embankments, which are liable to burst, especially in times of flood. The Adige which drains the Trentino, enters the sea by a separate mouth a little north of the Po.

The fine alluvial soil is exceedingly rich for agricultural purposes. Large crops of wheat, maize, mulberries, grapes, hemp, flax, rice and a small—comparatively negligible—amount of cotton are produced. So rich is the soil, and to such an extent is artificial irrigation practised, that as many as from four to six crops are

frequently obtained on the same land in the same year. Rice is chiefly grown in irrigated areas, and in the

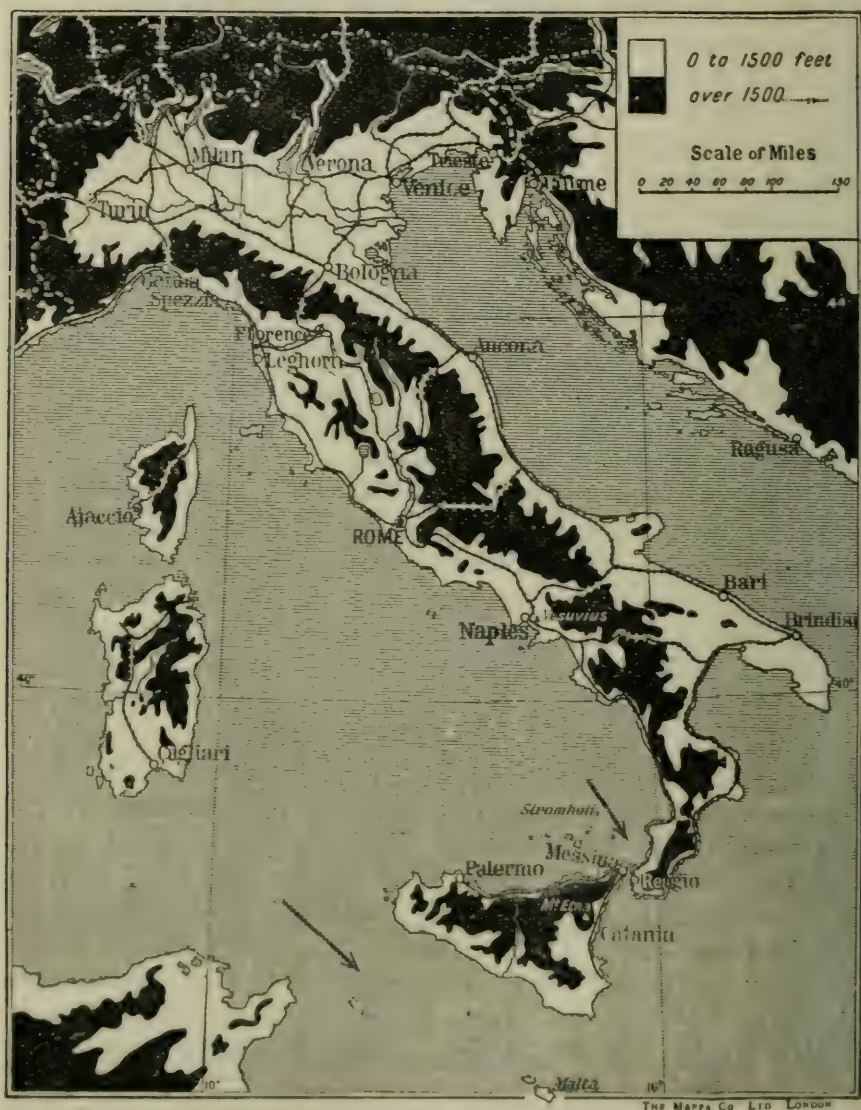


FIG. 70.—Italy. Relief and Routes.

swampy districts of the delta. Both rice and maize form leading articles of food. The mulberry is grown to feed the silkworm. Cotton-growing became important during the American Civil War, but the resumption of

the exportation of American cotton checked its cultivation, whilst the modern competition of Egypt provided a further check.

Pastoral occupations are also extensively carried on, particularly cattle-rearing and dairy-farming, as is shown by the fame of Gorgonzola and Parmesan cheeses.

The plain of Lombardy is the chief manufacturing area in the whole Mediterranean region. The natural advantages which have assisted the modern development of manufacturing industries cannot be described as very great. It is true that the great abundance of raw silk, of the cheap labour afforded by a population too large to be supported by agriculture alone, and the examples set by the neighbouring countries of France and Switzerland, all greatly helped. On the other hand, the available water power, large as it is, does not compensate for the lack of coal, whilst the iron ore of the Alpine valleys and the island of Elba is not sufficient.

Naturally, silk manufacturing comes first, but cotton and woollen manufacturing—the latter being of importance owing to the cold winters—are also engaged in. The cotton goods of Italy find a ready market in Argentina. The spread of textile manufacturing has been accompanied by the growth of iron trades.

Milan occupies a magnificent position with regard to the control of routes. It grew up as the "middle-plain" city, where the ancient road skirting the southern base of the Alps crossed the road from Genoa to Como. These roads and the railways which follow them are of great importance; but the site of the city is further enhanced by the fact that the routes via the Simplon and St. Gothard Tunnels converge upon it. Its textile and engineering trades have still further increased its importance (see Fig. 71).

Turin stands at the head of the navigation of the Po, but sufficiently within the plain to command several trans-Alpine routes, of which the chief is the Dora Riparia route to the Mont Cenis Tunnel and the Rhone basin. It has textile and engineering industries.

Venice, the "Queen of the Adriatic," is built on over

one hundred sandy islands on the edge of a shallow lagoon. The factors which aided the growth of this city are now a disadvantage. It is in this respect less fortunate than Milan. The city, which is reached by a railway built on a causeway, and is built on piles driven into the marshy soil, has some magnificent churches, art galleries, palaces, bridges and public buildings, in all of which its former greatness is visibly writ large. Ship-building and artistic manufactures—*e.g.* gold lace, glass, etc.—are leading occupations.

Trieste, formerly the chief Austrian port, lies in the extreme east of the plain. It engages in shipbuilding and has also oil, soap and candle-making industries. It will continue to serve as an Austrian outlet, for the Peace Treaties provide that the new coastless republics of Austria and Hungary shall have rights of way over the railways leading to their former Adriatic ports.

PENINSULAR AND INSULAR ITALY.

The "Mediterranean" parts of Italy are more backward than the plain of Lombardy, for in southern Italy the people of the country districts are often very poor; the fields and gardens are cultivated by methods which are often antiquated; the percentage of illiterate peasants is exceedingly high, and the emigration figures are high enough to be a source of grave national concern.

The Italian Riviera.—This part of Italy is an extension of the French Riviera, and forms the province of Liguria. The coastline follows the folds of the mountains, and everywhere the land rises steeply from the sea, so that cultivation practically depends upon the terracing of the hill-sides. This is extensively carried out, for the southern slope gives a climate extremely favourable to the cultivation not only of olives, vines and mulberries, but also of oranges and lemons, which are usually associated with the southern provinces. The gorgeous sea and land scenery and the mild winter climate have aided the growth of many winter health resorts. *Genoa*, the birthplace of Columbus and many

other famous sailors, is the largest town and the chief port. Its natural hinterland is the western part of the plain of Lombardy, from which it is separated by the mountains, although, fortunately, just behind the port there is the low Bochetta Pass. But the cutting of the great Simplon and St. Bernard Tunnels has extended the port's hinterland to Switzerland and even to southern Germany (see Fig. 71). Besides being a port, Genoa has also busy cotton, ship-building, soap (from olive oil) and iron industries. *Spezzia*, east of Genoa, is a naval and shipbuilding centre; at *Savona*, to the west, there are engineering works.

The Peninsula and Sicily.—Notice how the Apennines leave the west coast, sweep across to the east coast and finally return, in the "toe" of Italy, to the west coast. That part of Italy drained westwards by the Arno and the Tiber, and enclosed by the great eastern bend, is the portion of the country which has played a particularly prominent part in Italian history. A glance at a physical map is sufficient to show that all the highland areas of peninsular Italy are not included in the Apennines. Inside the eastern bend just referred to there is a rather complicated foreland of hilly country with volcanic areas noted for such typical crater lakes as that of Bolseno. In Apulia, the "heel" of Italy, the foreland consists of low limestone plateaus and plains. In Calabria, the "toe," and in north-east Sicily, there are remnants of ancient rocks, which, with Sardinia, Corsica and Elba, long ago formed parts of a common massif.

These differences in structure are mentioned because they produce differences in human activities. The Apennine folds are exceedingly poor in minerals, but there are forested areas where large numbers of chestnuts thrive and supply an important article of food as well as timber. In the vicinity of *Carrara*, north of the mouth of the Arno, the limestones have been changed to marble, which is extensively quarried there. In some of the volcanic areas, particularly in the Alban Hills and in Campania, there are some of the richest olive, vine, etc.

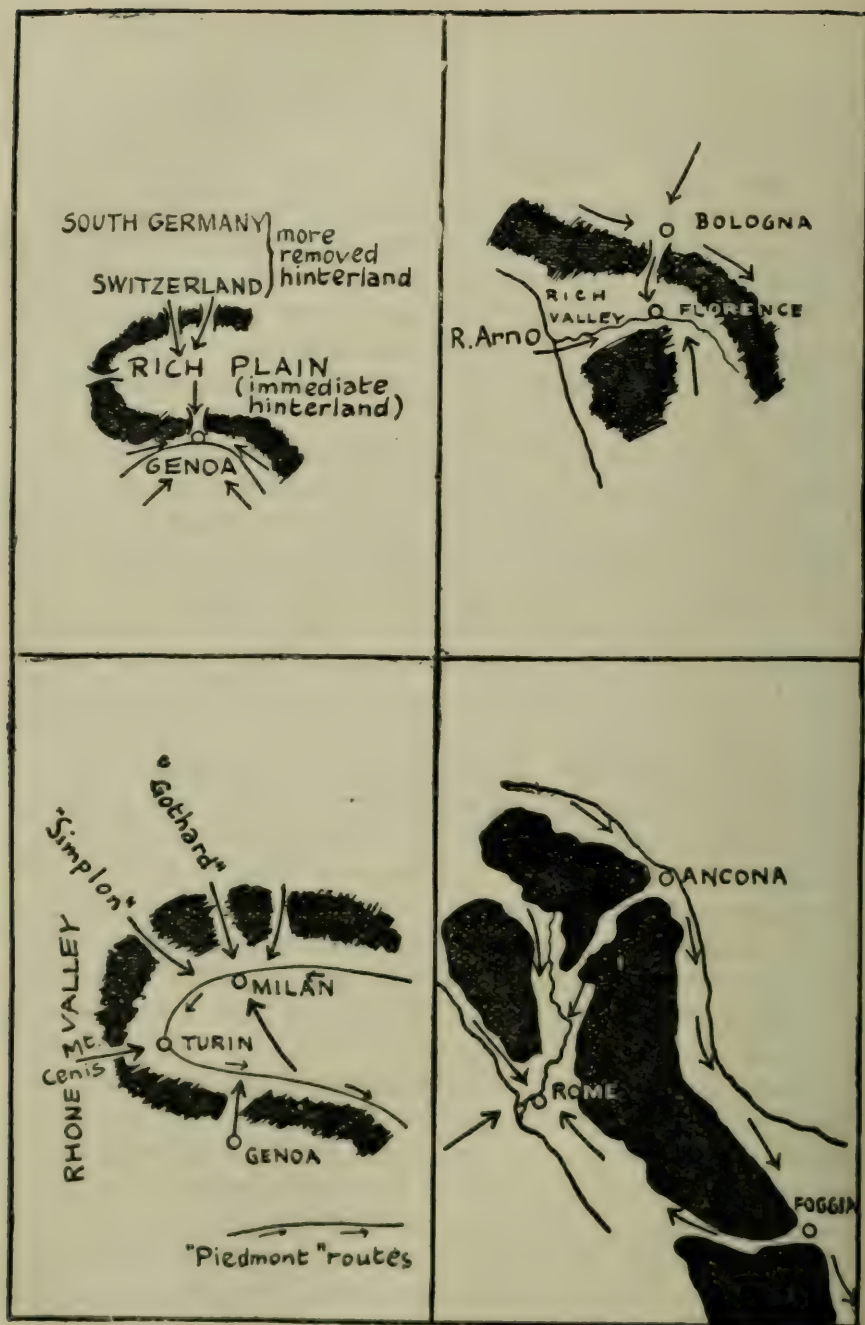


FIG. 71.—Sketch Maps showing the importance of the sites of Genoa, Florence, Milan and Rome.

gardens in all Italy. In Apulia, the dry climate, the fertile soil and the extensive plains all favour the growth of wheat on a large scale, so that this province is the chief wheat-growing area in the country. It produces the hard wheat which is especially suitable for the manufacture of macaroni. The ancient rocks of Elba are rich in iron ore, whilst in Sardinia lead and zinc are mined.

The river Arno drains Tuscany, whose chief cities are Florence and Leghorn. *Florence*, in the plain of the upper Arno, one of the richest little "regions of increment" in the Mediterranean, is the centre of a rich region producing the "leggy," hard wheat whose straw forms the basis of a straw-plaiting industry, and whose grain is manufactured into macaroni. A low pass over the Apennines gives easy rail communication with Bologna (see Fig. 71). *Leghorn* is the Tuscan port, but it is not situated at the mouth of the Arno owing to silting troubles. *Pisa* is the old port.

The Tiber, the chief river of peninsular Italy, rises in the Apennines and flows due southwards to its delta mouth among the marshes of the low coastal plain. Its valley is followed by important routes. *Rome*, the great city of the Tiber basin, occupies a very important site. It was built: (i) at the head of the navigation for ships of that day, and was thus sufficiently far from the coast to be protected from pirates; (ii) on the left bank of the river, at a point where a cluster of seven low hills gave it a healthy and dry site above the marshes of the lower valley; (iii) at a point where an island rendered the bridging of the river a matter of comparative ease; and (iv) at a point upon which many routes converged (see Fig. 71. All these, together with its excellent central position with regard to the control of the Sicily bridge between both Mediterranean basins, made the city the greatest of the ancient world. In the beginning of the city's history these advantages enabled the peoples south of the Tiber to organise a strong defensive point against their Etruscan enemies who threatened to overwhelm them). The mouth of the Tiber is now silted

and the port of Rome is Civita Vecchia. Much of the city is of modern origin, but it still retains monuments of its past greatness in the ruins of the Forum and the Coliseum and in the magnificent cathedral of St. Peter's. It is the Italian capital.

Naples is the largest town in Italy. It stands on a beautiful bay of the same name, and has the famous volcano of Vesuvius for its background. It has the great advantages of being the only really good harbour between Leghorn and Messina, and of commanding the most important route across the Apennines, *i. e.* the one via Foggia, as well as the routes along the west coast. It has textile, lace, engineering and macaroni industries.

The eastern coastline of peninsular Italy is very poor indeed, for it is straight, has no adjacent islands and has no good natural harbours. It offers a remarkable contrast to the opposite coast of the Adriatic, and places Italy at a great naval disadvantage, hence one reason why the Italians were interested in the fate of the Dalmatian Coast and islands.

Sicily is a continuation of the Apennine chains and forms a link between peninsular Italy and the Atlas ranges. In the east the great volcano of Etna rises to a height exceeding two miles. The sulphur obtained in this part of the island forms the chief mineral wealth of Sicily, and gives employment to many people engaged in refining it prior to export, but the industry has declined in recent years. The island is exceedingly fertile and produces all the Mediterranean products, especially wheat and wine. *Palermo*, the capital, is noted for its orange and lemon groves. It has also shipbuilding and iron industries. Communication with the mainland is chiefly carried on between *Messina* and *Reggio*. The former stands in a district famous for its mulberries and hence has silk industries. In 1908 it was very largely destroyed by a great earthquake.

Sardinia.—The interior of Sardinia is a wild, rugged, forested highland rising to about 6,000 feet. The lowlands are marshy and malarial. The island has mineral deposits, especially lead and zinc, and there is a con-

siderable trade in salt, obtained by the evaporation of sea-water. The surrounding seas are good fishing grounds, but forests, mines and fisheries are not exploited to the extent they might be. Mediterranean fruits, wheat and pulses are grown, and horses, sheep and goats are bred. The capital and chief port is *Cagliari*, on the south coast.

CHIEF ROUTES.

Italy is like a great pier built out into the Mediterranean. It has thus become the means of giving a partly overland route to the East, and this has been enormously helped by the tunnelling of the Alps.

Alpine railway routes reach the plain of Lombardy, from France (Mont Cenis Tunnel), from Switzerland and the Middle Rhine (Simplon and St. Gothard Tunnels), from Tirol, Bavaria and central Germany (Brenner Pass—no tunnel), and from Vienna (Semmering Pass and the lower eastern Alps). All these lines are linked up by an east-and-west line skirting the southern margins of the Alps from Udine to Turin. The overland route from Calais and Paris reaches the plain at Turin, and then follows the ancient Emilian Way along the eastern margins of the Apennines to Brindisi or Taranto, from which fast steamships leave for Port Said where the eastern mailships are met.

Just as the long, narrow peninsula with its more or less central mountain ridges helped the development of the east coast route, so we have a west coast route. The chief connections between the two systems cross low Apennine passes between Genoa and Alessandria, Florence and Bologna, the upper Tiber and Ancona, and Naples and Foggia.

In ancient times Italy was the centre of the known world, and her capital, Rome, was the meeting-place of every race and creed. Later, the long and unhappy political division of the country, and the opportunity that was missed of taking a leading part in the great period of discovery, caused her to sink in importance.

But the opening of the Suez Canal, the piercing of the Alps, and the consolidation of the country into one political unit, have enabled her to resume her place in the world, and although her late entry has left her without such valuable colonial possessions as are held by most of her rivals, the great energy which has been put into the establishment of new industries, and the success of the Italian colonist both in South America and in the United States, are indications of a great modern renaissance in this sunny land. The extension of Italian influence to Africa (Tripoli and Eritrea), to Asia Minor, to the Ægean islands and to the eastern margins of the Adriatic, also points in the same direction.

THE MALTESE ISLANDS.

This group of islands, which belongs to Britain, owes its importance to its command of the straits between the eastern and western basins of the Mediterranean, a position of such strategic value that it has been held or fought for by Phœnicians, Greeks, Carthaginians, Romans, Arabs, Crusaders, Turks, French and British. The chief island is Malta, whose area is about two-thirds that of the Isle of Wight. Gozo and Comino are smaller. *Valetta*, the capital, has a magnificent harbour, which is so important both as a naval repairing and refitment station and as a commercial harbour that it is too small for the demands made upon it.

The islands are exceedingly fertile and produce all the Mediterranean products in great profusion, as well as early potatoes and fruit for the English markets. Large numbers of goats and sheep are reared, the former providing most of the milk supply. Hand-made lace is a noted special industry.

THE BALKAN PENINSULA.

PHYSICAL FEATURES.

The Balkan Peninsula is a bridge between Europe and Asia. The great land route to the East lies across

it, and since this leads over Asia Minor and the plains of the Tigris and the Euphrates to the Indian Ocean, it is a bridge of great importance.

The greater part of the peninsula consists of highlands which shut off river valleys and basins from each other, and have thus helped to give to the peninsula the complicated and difficult racial and political problems which again and again cause war and rumours of war, and provide Europe with its Near'Eastern Question. Complicated as is the relief of the Balkan Peninsula, it may be considered under three headings. Along the west coast the Dinaric Alps are continuations of the Alps proper. These ridges are continued southwards, and may be traced throughout the whole length of the western part of the peninsula, and beyond, through the islands of the Crete and the Cyclades group, to the mountains of Asia Minor. In Greece, which has been so sunken that the river valleys have almost disappeared, the direction of the ridges is clearly seen in the finger-like projections of the Morea. The Dalmatian coastline should be compared with that of Norway and contrasted with that of Italy on the other side of the Adriatic.

In the north-east, the Balkan Mountains are continuations of the great sweep of the Carpathians, and they may be traced through the Crimea to the Caucasus.

The western mountains keep close to the western coast, and the Carpathians-Balkans system makes its great bend because the heart of the peninsula consists of an ancient crustal block against which these younger mountains were thrown into folds. This central block of older rocks, which has been greatly denuded, comprises, not only high mountainous areas like the Rhodope and Shar Dagh, but also plateaus, river valleys and broad plains. Curved lines, drawn from Belgrade to the Bosphorus and from the same city to the island of Negropont, roughly bound this region (see Figs. 47 and 72).

Three Balkan rivers are of outstanding importance. They are the *Morava*, which flows northwards to the Danube; the *Vardar*, which continues the line of the

Morava southwards to the *Ægean* Sea ; and the *Maritza*, whose valley leads routes following the Morava on towards Constantinople. These river valleys offer the best routes in the peninsula, and times and times again they have determined the movements of man, both in peace and war.



FIG. 72.—The Balkan Peninsula. Relief and Chief Routes.

CLIMATE AND NATURAL VEGETATION.

The western and southern coastlands have mild winters and hot summers. The north-east has very cold winters and very warm summers, whilst in all the highlands the effect of elevation is to reduce the temperature at all seasons. The rainfall in the west and south occurs

largely in winter, whilst the north-eastern lands have most of their rains in summer. The heaviest fall is on the Western Highlands, and the amount generally decreases towards the north-east, but towns like Athens and Salonika, which are to the lee of the Western Highlands, have less rain than Constantinople. Indeed the Salonika, Athens and Dobrudja areas are the driest in the peninsula.

As will be seen from this short account, the peninsula has two distinct climatic regions. In the west and south we find the characteristics of the Mediterranean type, and in the north-east those of the continental type.

In the Mediterranean area evergreen forests are found on the lower slopes of the mountains. In the western mountains large areas are dry limestone karst-lands, where the drainage is largely underground, so that the surface is generally bare, although there are areas which have sufficient pastures to support herds of cattle and flocks of sheep and goats. The forests of Greece, southern Serbia and Bulgaria, and of Turkey have been largely cut down, with results as disastrous as those we saw in Italy. In Serbia and on the northern slopes of the Balkans the forests are largely deciduous, and chiefly contain oaks and beeches, so that pig-keeping becomes an important occupation.

BRIEF HISTORICAL OUTLINE.

The Turks entered the Balkans in the fifteenth century, and, except for Montenegro, conquered the whole peninsula and swept along the Danube towards the heart of Europe, as well as along the north coast of the Black Sea. They captured the Hungarian plains, but Vienna never fell to them. In the seventeenth century the retreat began, and most of the Hungarian plains were lost. In the eighteenth century the territory east of the Dnieper and the remainder of the Hungarian plain were torn from their grasp. The nineteenth century saw the freedom of Bosnia, Serbia, Rumania, Bulgaria and Greece. In 1912 the Balkan League (Serbia,

Bulgaria, Greece and Montenegro) fought Turkey and drove the Turkish armies behind the lines of Chatalja. Unfortunately they then quarrelled about the division of the spoil, and Serbia, Greece and Montenegro fought Bulgaria, whose ruler said he would get his demands by the sword. However, Rumania came in against Bulgaria, and the latter country was forced to submit. At the peace which brought hostilities to a conclusion, not only was a new country created, *i.e.* Albania, but every Balkan country except Turkey gained territory, chiefly at the expense of Turkey, so that the Sultan's European dominion was reduced to the lower Maritza valley and the Constantinople peninsula. On account of this gradual shrinking of the Turkish European possessions the Sultan has been called the "Sick Man of the East."

The outbreak of the Great War in 1914 found most of the Balkan countries discontented with their recent gains. The Serbians were hungering for an enlarged Serbia which should include Bosnia and Herzegovina, and have an outlet to the Adriatic. Montenegro longed to regain Scutari, which had been won during the last war, Bulgaria was smarting under her defeat, and was particularly angry with Serbia and Rumania, whilst the latter country looked forward to the possession of Transylvania, where three million Rumanians live. Turkey found a friend in Germany, and looked forward to the opportunity of regaining some of her lost territory, and of gaining a tighter grip on her Asiatic possessions, which were still very extensive and important.

Perhaps the ideal state of affairs would be to make the boundaries of the various states coincide with racial frontiers, but this is impossible. The different nations are mixed, especially along the marginal areas between the different states. In Macedonia, whose possession is disputed by Bulgars, Serbs and Greeks, there is not only no Macedonian race, speech or religion, but there is not even one dominant race, speech or religion. The population is composed of Turks, Greeks and Bulgars in about equal numbers, and all of them speak

two languages, and very frequently three. The sole desire of the Macedonian peasant is to be left alone. If you ask him what race he belongs to, he invariably replies, "I am a peasant."

THE JUGO-SLAV REPUBLIC, OR THE SERB-CROAT-SLOVENE STATE.

The former small country of Serbia now takes the leadership of a large state whose area is about 75,000 square miles, and whose people number some 10 millions. It covers the territory occupied by the Jugo-Slav, or south Slav, peoples of whom the Serbs, Croats and Slovenes are the chief, and includes Serbia, Bosnia, Herzegovina, Montenegro, Croatia, Slavonia and Slovenia. The exact boundaries have, in several cases, not yet been fixed, especially where they march with those of Italy and Bulgaria, whilst a plebiscite has to be held as to the fate of the Klagenfurt area.

The Adriatic margins have the typical Mediterranean climate and products; the inner belt of dry mountainous uplands support pastoral occupations, except in the river valleys where agriculture takes place; the lands south of the Drave, together with the Banat (both gained from Hungary), are noted for their agriculture and stock-rearing (in the Banat the summers are hot enough for rice); whilst in old Serbia, where the climate is continental in character, the oak and beech forests of the hills support enormous numbers of pigs, and in the plains, wheat and maize, tobacco, wine and plums (for brandy and prunes) are very important cultivations.

In many parts of the new country minerals are known to exist, but, except in Serbia, very little mining takes place.

Belgrade, the capital, is built on high ground at the confluence of the Save and the Danube, a position of considerable importance, since the Danube is a great, navigable international river. The city also commands the Orient route to Constantinople via the valley of the Morava. *Nish* stands on the Nishava just before its



FIG. 73.—Yugo-Slavia.

confluence with the Morava. The Nishava valley carries the Orient route eastwards, whilst the Upper Morava and the Vardar valleys lead the Salonika railway due southwards. Nish is therefore a very important railway centre. *Uskub*, a very ancient city, stands in the upper Vardar basin and commands the lowest part of the watershed between the Morava and Vardar basins. The chief Adriatic ports are *Spalato* and *Ragusa*. The latter is reached by a railway from Buda-Pest which utilises the valley of the Brosna, and passes through *Serajevo*, the chief city of Bosnia, a city which has many claims, especially on the grounds of site, to selection as the capital of the new country.

The great mass of the people of this new country are Slavs (akin to the Russians), and 80 per cent. of them are agriculturists who own their own land. In the past their differences in religion, language, etc., have been too great for them to combine, but now the opportunity is theirs, it is to be hoped they will use it to develop a strong and sturdy state, for there appears to be sufficient common feeling of nationality for this. The Slavs have great gifts for co-operation; one of their drawbacks in the past has been a lack of initiative.

ALBANIA.

This country was proclaimed independent in November 1912. Along the coast there is a narrow plain, but the greater part of the country, like Montenegro, consists of a stony, limestone karst highland, where few trees are found, and where the rearing of cattle and sheep is the only important occupation. Long centuries of neglect and misgovernment have produced a land with few good roads or bridges, with no railways and practically no foreign trade. Even where agriculture is carried on—*e.g.* along the coast—the methods employed are exceedingly primitive.

The capital and chief port is *Durazzo*. *Scutari*, to the south of the lake of the same name, is the largest town.

Owing to their isolation and the difficulty of access to

their country, the Albanians enjoyed practical independence long before it was finally recognized. They are a warlike race, who give themselves a name which means "rock-dwellers," and, even if tribal feuds, which appear to be deep-rooted institutions, have prevented them from developing a real national spirit, there is nevertheless an Albanian nation whose assimilation has been attempted by many conquerors but always without success.

GREECE.

As a result of the Great War, Greece has made very considerable territorial gains in Europe. She has also been given the rights of sovereignty over Smyrna and the adjoining territory, although both remain nominally Turkish.¹

The New Territories.—Of these the richest are the plains of Thrace, where rich harvests of wine, tobacco and grain are secured. *Adrianople*, the chief city, stands at the confluence of the Maritza and the Tunja. It has an important silk manufacturing industry. Between Adrianople and Constantinople the country is so dry that it is a steppe land with pastoral occupations. The lands gained from Bulgaria are very backward. The chief port is Dedeagach, which lies a little east of the mouth of the Maritza. It should be noted that the railway from Salonika to Constantinople now passes almost entirely through Greek territory, and also that for some purposes Greece recognizes the authority of the Commission of the Straits (see p. 282) over part of the new territories.

The Macedonian Area has rich agricultural lowlands producing maize, wheat, cotton, tobacco and olives, but the methods used are very backward, and there are still large areas of malarial swamp lands. Its highland portions are believed to be rich in minerals, but mining has scarcely begun. *Salonika*, the chief town and port,

¹ The adjustment of territorial claims as between Greece and Turkey is now undergoing reconsideration.

stands at the head of the Gulf of Salonika, east of the unhealthy lowlands of the mouth of the Vardar. It is where the great Belgrade-Nish-Uskub-Salonika route reaches the Mediterranean. Salonika is also connected by railway with Monastir, Athens and Constantinople. It has a considerable trade which is chiefly in the hands of Jews.

The Plains of Thessaly produce the crops of Macedonia but in greater quantities, for they are the chief agricultural areas in the country. Wheat and tobacco are the chief crops, most of the tobacco being exported to Alexandria and Cairo for manufacture into Egyptian cigarettes. *Volo* is the largest town and chief port.

Central Greece is largely a highland area, noted for the rearing of sheep, goats and pigs, but even here the agriculture of the small plains is of prime importance. It is very rich in minerals, and lead, iron, zinc and marble are all obtained in small quantities. *Athens*, the capital of Greece, stands about six miles from *Piræus*, its port. The modern city is built on the plain surrounding the Acropolis, the great rock on which the ancient city stood. *Piræus* is a prosperous port—the chief in Greece—with growing textile and engineering trades.

The Morea is the peninsula south of the Gulf of Corinth. Here, too, agriculture is the chief occupation, and the leading product is the small, black, seedless grape, which when dried is called the *currant*. Pastoral occupations are followed in the hilly interior. *Patras*, at the entrance to the Gulf of Corinth, is the chief port of the Morea. It is largely occupied in the currant trade. *Corinth* is now a very small town on the narrow isthmus of the same name. A canal has been cut through the isthmus, and this may help to bring back to the town some of its former greatness, although it is unfortunate that the canal cannot accommodate large steamers.

The Isles of Greece.—*The Ionian Isles* rise above a submerged platform extending seawards from the western coast. All produce the currant, whilst *Corfu* is

noted both as a winter resort and for the excellence of its olives. *Crete* is a large, long, narrow, mountainous island. Its narrow plain and terraced hill-sides produce all the Mediterranean fruits and cereals, whilst its pastures support numbers of cattle, sheep and goats. The capital is Canea, but Suda Bay, which is quite close, is the best harbour. Practically the whole of the islands in the *Ægean Sea* now belong to Greece. *The Cyclades* is a group of rocky islands east of the Morea. They are the highest parts of submerged mountain chains. Most of them are bare and unproductive, but a few export wine and fruits. Iron ore is obtained in Seriphos, sulphur and manganese ores in the volcanic island of Milos, whilst the white marble famed for its use in statuary is still obtained in Paros. *Eubœa*, or *Negropont*, is the long, narrow island lying off the east coast of central Greece. Its fertile soil yields Mediterranean produce, but it also exports marble and magnesia. Near Chalcis the island comes so close to the mainland that a bridge has been built across the narrow strait between them. *The Sporades*, or scattered islands, lie north-east of Eubœa. The chief commercial centre of the *Ægean Archipelago* is *Hermopolis*, on Syra, one of the Cyclades.

The People of Greece.—The ancient Greeks reached an exceedingly high standard of civilization. The many fertile plains isolated from each other by mountain barriers, across which there were few passes, assisted the organization of a number of independent city states, whose chief means of intercourse was by the sea. Thus, the habit of the sea was ingrained, and settlements were established westwards as far as Marseilles, southwards at Alexandria, and eastwards at Byzantium (Constantinople) and Odessa. The modern Greek speaks a language which is a corrupt form of classical Greek, and like the ancient Greek he is at home on the sea. He is the chief carrier of the Levant, whilst as a merchant he may be found not only in all parts of the Mediterranean and Black Seas, but in most of the great ports of Western Europe.

BULGARIA.

Bulgaria consists of alternate belts of east and west running highlands and lowlands. Between the Balkans and the Danube there is a limestone foreland. As we have already seen, this part of the Balkans has an extreme climate, whose very warm and dry late summer is excellent for the cultivation of wheat and maize, the leading crops. Pastoral occupations are also important. This belt is succeeded by the forested Balkans, which are higher in the centre and west than in the east. South of the Balkans are the plains of Eastern Roumelia, which lie in the upper basin of the Maritza and its tributary, the Tunja. Communications between the lowlands on either side of the Balkans follow three main routes; (i) from Sofia by means of a railway following the valley of the Isker, (ii) by road over the Shipka Pass near the centre of the Balkans, and (iii) along the east coast. Eastern Roumelia is a Mediterranean region, producing wheat, wine, fruit, tobacco, and even rice. The cultivation of roses for the manufacture of the famous scent, attar of roses, is extensively followed on the hill slopes, and particularly in the neighbourhood of the Shipka (= Wild Rose) Pass. The pasture-lands support large numbers of cattle and sheep.

Sofia, the capital, stands in the basin of the upper Isker, in a very important position for the command of several routes. The main Orient-Express route from Nish passes through it on its way to the Maritza valley, whilst routes from the Danube, via the Isker, and from the Struma valley also converge upon it. *Philippopolis*, on the Maritza, the chief centre of Eastern Roumelia, stands in a region of great fertility. *Varna*, the chief port, is becoming a manufacturing centre, especially of cotton. Here it may be noted that Bulgaria has at present few manufactures, but in recent years industries have sprung up in different parts of the country. A beginning has also been made in the development of the mineral resources. *Rustchuk* is an important river

port situated where the railway from Bucharest to Varna crosses the Danube.

The Bulgarian people are of mixed Slav and Mongol, that is, of mixed white and yellow, extraction. Their country was formerly inhabited by Slavs of the same race as the Serbians. In the eighth century, Mongols of the same race as the Finns and the Magyars entered the peninsula by the north-east gateway, conquered the original Slav inhabitants of Bulgaria, and settled amongst them, with the remarkable result that they adopted both the Christianity and the language of the conquered Slavs.

TURKEY.

Of all the former vast European possessions of Turkey all that remains is the small peninsula at the tip of which stands Constantinople, and even this small territory comes under the control of the *Commission of the Straits*. This Commission is composed of representatives of the Allied powers, as well as of Russia, Bulgaria and Turkey, if and when these countries become members of the League of Nations. The authority of the Commission, whose functions will include the control of anchorages, of pilotage, of lighting and buoys in the channels, etc., as well as of seeing that in peace and war the navigation of the straits is open to ships of all nations, extends over all the territories shown on Fig. 72.

Constantinople is built on both sides of the Golden Horn, an arm of the Bosphorus, and also on the Asiatic side of the straits. Stamboul, the Turkish city, lies south of the Golden Horn, which separates it from Pera, where most Europeans reside, and Galata, the business part of the city. Scutari is that part of the city lying on the Asiatic shores of the Bosphorus. Constantinople commands two great routes, that from Asia to Europe, and the sea route from the Mediterranean—via the Dardanelles, the Sea of Marmora and the Bosphorus—to the Black Sea. At Constantinople the straits are

only about a mile wide, about two miles further up towards the Black Sea they are narrower still. It is almost certain that had the city been in the possession of one of the more advanced European nations, the straits would have been either bridged or tunnelled, thus giving through communication between the railways of Europe and South-west Asia. One disadvantage, however, is the fast current which flows from the Black Sea through the narrow passages leading to the Ægean.

QUESTIONS AND EXERCISES.

1. "Britain and Russia are admirably suited for trading with each other. Each country has a superabundance of articles the other requires." Discuss this statement. How does it apply to Germany? Discuss the relative advantages and disadvantages of Britain and Germany for participating in Russian trade.

2. Draw an outline map of the coasts of the North Atlantic Ocean. Mark on it: (i) the January isotherm of 32° F. and the July isotherm 60° F.; (ii) the chief ocean currents; (iii) the prevailing winds. Write a short description of the map, with special reference: (a) to the climatic differences between Norway and Sweden; (b) to the ice-free Norwegian ports and the winter ice-bound Swedish ports.

3. Why is it that: (i) Tromsö is ice-free, whilst Lulea on the Gulf of Bothnia, although further south, is ice-bound in winter? (ii) At North Cape the sun never sets between May 12 and July 29? (iii) The Baltic Sea is very brackish?

4. Describe the natural advantages and disadvantages possessed by Denmark. How far have the advantages been made use of, and how far have the disadvantages been overcome?

5. On a map of France insert the 1,000 feet contour line and shade all the land over 1,000 feet in elevation. Indicate by arrows the main routes which lead into France, and show how these reach the Paris basin. Indicate the Gaps of Zabern, Burgundy, Montélimar, Carcassonne, Poitou, and mark the towns commanding them.

6. How may goods be carried by water: (a) from Paris to Marseilles; (b) from Rouen to Orleans; (c) from Lyons to Strassburg; (d) from Strassburg to Paris; (e) from Bordeaux to Marseilles?

7. In the early days of the Great War the names Liège, Namur, Charleroi, Mons, Maubeuge, St. Quentin came successively into great prominence. Why was this?

8. Why is it that Belgium both imports and exports large quantities of wool, flax, coal, wheat?

9. On a map of Holland shade the lands which are below sea-level, taking care to insert the coastal dunes correctly. Now mark the parts of the coasts and the banks of the rivers where the construction of dykes is necessary. If Holland were uplifted 25 feet indicate the new areas which would be added. Insert the New Waterway, the North Holland and the North Sea Canals. Mark the positions of Rotterdam, Amsterdam, the Hague, Utrecht, Flushing, Hook of Holland, and indicate the chief railway routes.

10. Draw an east and west section across Holland in the latitude of Amsterdam. Explain its leading features.

11. Show how geographical conditions have aided the growth and importance of Berlin, Cologne, Munich, Breslau, Coblenz. Add sketch maps to illustrate the points brought out in your written description. (See Fig. 71.)

12. Draw a map of the Basin of the Danube. Indicate the countries or states which it drains. Shade the highlands which come within the basin. Indicate the chief means of communication both within the basin itself and between the basin and outside areas. Add a short account of the seasonal supply of water to the different parts of the main stream or its tributaries.

13. Give the exact location of the St. Gothard Pass. What is meant by a pass? Why do railways tunnel below the pass and roads go over it? How far is it correct to call the St. Gothard Pass the "Key to Switzerland"?

14. "When Carthage fell, Rome became the mistress of the Mediterranean, and Roman arms penetrated all the natural routes opening from it." Give examples of the "penetration."

15. Compare the relative importance of the western and eastern basins of the Mediterranean in modern times.

16. Compare and contrast the Iberian with the Scandinavian Peninsula in as many ways as you can.

17. Carthaginians, Romans, Goths, Vandals and Moors have all entered Spain. Do you know of any traces left by each?

18. Contrast the Plain of Lombardy with the Prussian Plain as regards structure, climate and industries.

19. Draw a map of Italy shading the high ground. Indicate the routes by which the Plain of Lombardy is entered by land; the chief routes across the Apennines; the east and west coast peninsular routes; the chief centres for the production of silk, olives, oranges, wheat, sulphur, iron, rice, maize, dairy produce.

20. Write a synthetic geographic account of each of the new countries created by the one or other of the Peace Treaties. In each case, add notes on the geographical elements of permanence.

PART IV .

ASIA

PHYSICAL FEATURES AND STRUCTURE.

ASIA, the greatest of all the continents, lies to the east of Europe and North Africa. Its most northerly point, Cape Chelyuskin, is within 13° of the North Pole, and its most southerly, Cape Romania, is only 1° north of the Equator. In an east and west direction, the continent extends for an even greater distance.

A physical map shows a great belt of highlands stretching across Asia from west to east. This belt continues that of southern Europe. It consists of mountain chains enclosing plateaus. Thus from west to east we have the plateaus of Asia Minor, Iran, Eastern Turkestan and Tibet enclosed by great loops of fold mountains which approach each other in the Pamirs, the "roof of the world." To the east of Tibet the older highlands of southern China was a bulwark of resistance to the earth movements which formed these chains, and therefore the latter turn southwards where they can be traced through Indo-China and the East Indies (see Fig. 74).

To the north of this highland belt are extensive plains stretching to the Arctic Ocean, and consisting, for the most part, of undisturbed, unfolded, sedimentary rocks which lie in horizontal layers, but, as Fig. 74 shows, the western portion has been covered by deposits of silt and alluvium which have been spread over the area by the rivers.

To the south of Asia we have the two plateaus of

Arabia and the Deccan, both remnants of a former vast plateau continent which stretched across the world from west to east (Fig. 75). Both are bordered by scarps and are so tilted that their long slope is towards the east, and both are separated from the mass of the continent

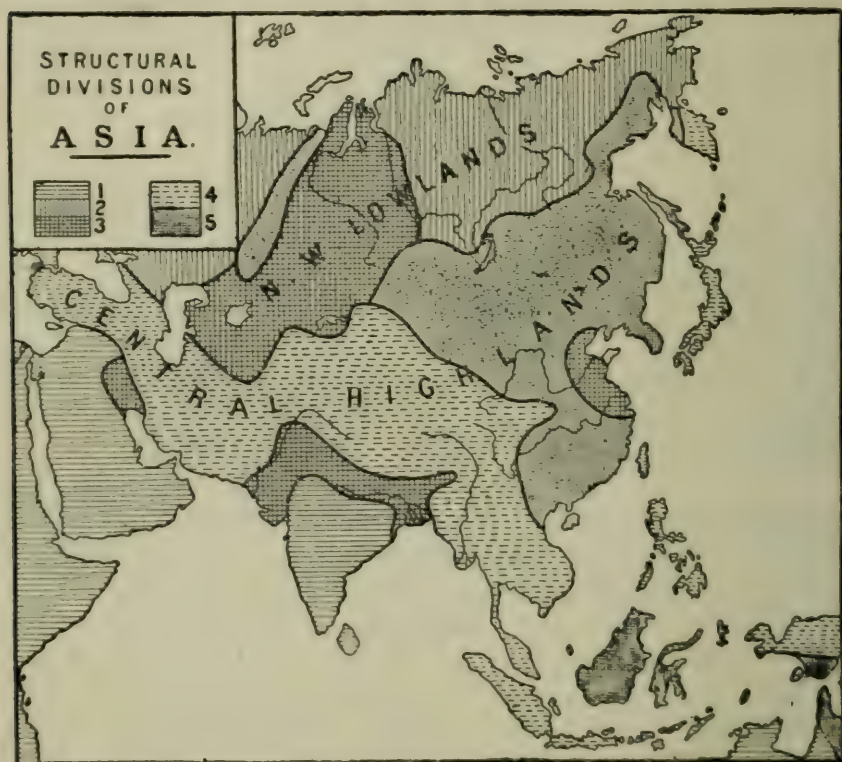


FIG. 74.—The structural divisions of Asia.

1. Plateaus of unfolded rocks.
2. Unfolded lowlands.
3. Unfolded lowlands of recent deposits.
4. Folded mountains and enclosed plateaus.
5. Highlands of rocks folded in ancient times now greatly denuded and fractured block mountains and basins.

by alluvial plains (Mesopotamia and the Indo-Gangetic Plain) which have been built up by river deposits (Fig. 74).

The true eastern limits of Asia are to be found in the festoons of volcanic islands which stretch southwards from the peninsula of Kamchatka. The seas between

these islands and the mainland occupy basins which have been created by the subsidence of blocks of the earth's crust. We should note that this east Asiatic island chain is part of a great volcanic belt which runs all round the margins of the Pacific Ocean (Fig. 148).

We have still to consider the eastern margins of the main continental mass of Asia. Here we find broad plains drained by great rivers such as the Amur, Hwang-ho and Yangtse-kiang, but there are also the



FIG. 75.—The great southern plateaus of unfolded strata. It is probable that long ago they formed part of an ancient southern continent.

ancient folded highlands of Borneo, South China, eastern Manchuria and Korea, as well as the Khingan Mountains and those highlands extending north-eastwards from Lake Baikal. Borneo is a detached portion of the mainland from which it is now separated by very shallow seas which form a good example of a continental shelf. The Khingan Mountains have a steep slope to the Manchurian Plains and a gradual one to the desert of Gobi. They owe their origin to the faulting and tilting of a huge block of the earth's crust.

CLIMATE.

In a vast land mass stretching through 76° of latitude, and containing the world's highest mountains, its highest and most extensive plateaus and some of its greatest plains, we shall expect to find many types of climate.

Temperature.—The great facts to keep in mind are the contrasts between the cold of winter and the heat of summer experienced by the interior lands. Fig. 6 shows that a large proportion of the land has a temperature below freezing point in January. It will be seen that the only parts which are free from frosts in winter are in the south and south-east. Fig. 7 shows that in July the greater part of the continent has a temperature exceeding 68° F., whilst the areas in which little rain falls (Iran and Arabia) have a very high temperature indeed, as there is little or no covering of cloud to lessen the heat. The influence of the Indian and Pacific oceans is seen in the lower temperature of the coastlands compared with those of the dry areas just mentioned, and in the southerly bends of the isotherms on the east coasts.

Pressure, Winds and Rainfall.—Owing to the land becoming very hot in summer, a low-pressure area is created towards which winds flow from the oceans, where the pressure is higher. Since this inflowing air is cooler and denser than the heated air, the latter is forced to ascend. Thus the greater part of Asia receives inflowing winds in July (see Fig. 10). In January the conditions are reversed (see Fig. 9). The land masses in the heart of the continent are extremely cold, and this produces a great high-pressure system which hangs over Central Asia like a heavy cap. From this system winds flow outwards towards the oceans, where the pressure is less, so that the greater part of Asia has cold outflowing winds in winter.

A comparison of Figs. 15 and 16 will show that most rain falls in summer when there are the inflowing winds. If Fig. 76 is studied in connection with a relief map, it

will be seen that these summer winds deposit most of their moisture on the mountains with which they first come into contact, and pass on as dry winds. South of a line from the mouth of the Indus to Korea is a

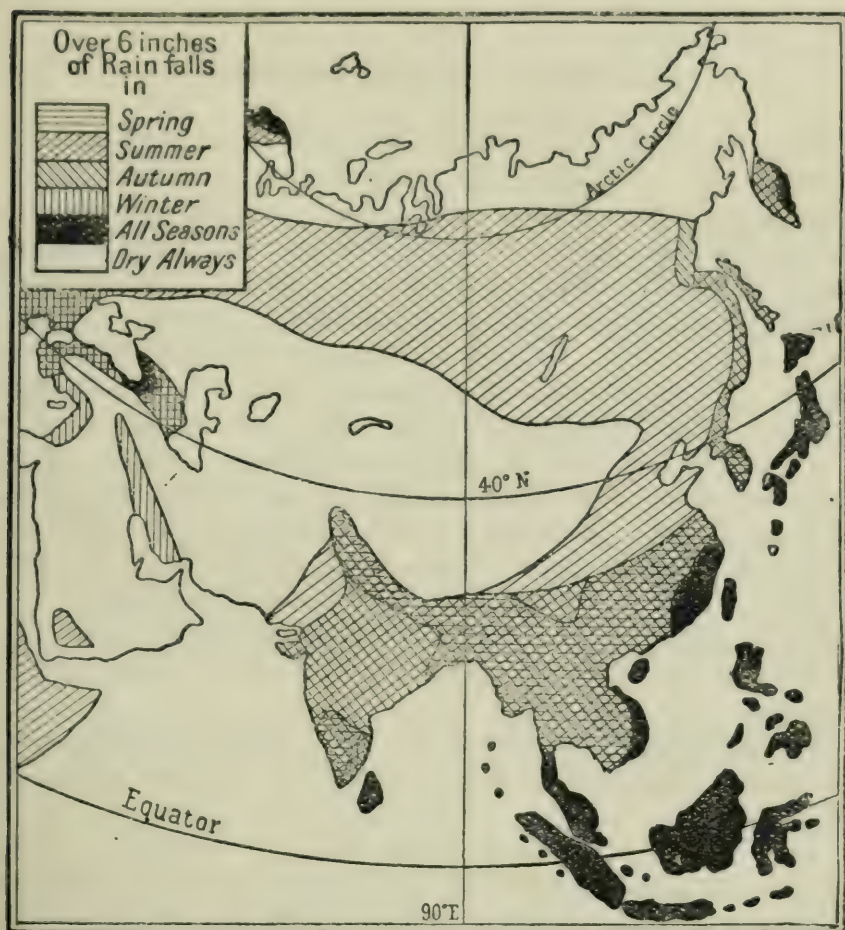


FIG. 76.—The seasonal distribution of rain in Asia.
(After Herbertson and Supan.)

region over the greater part of which there is a heavy summer rainfall. Summer rainfall, though small in amount, is also experienced in a broad band stretching across the north of the continent. The lands bordering the eastern Mediterranean have the dry summers and

wet winters typical of the Mediterranean shorelands. Ceylon, the Malay Peninsula, the coastlands of China, the islands in the eastern volcanic chain and the East Indies all have rain at all seasons. The rest of the continent receives little rain at all (see Figs. 14 and 76).

NATURAL VEGETATION.

Fig. 18 shows the world distribution of vegetation. It will be seen that the tundra, the cool-temperate forests and the steppe of Europe are all continued eastwards into Asia. The coniferous forests of Siberia are very dense, and give shelter to many kinds of fur-bearing animals, of which the chief are the sable, fox, mink and ermine. These forests gradually give place to the grassy steppes, the richer parts of which are rapidly becoming important wheat-producing lands.

Towards the Sea of Aral, the steppes merge into semi-desert or scrublands in which are extensive areas of true desert. Deserts are also found in the rainless parts of Arabia, Iran, Tibet, and Mongolia. In the higher parts of Arabia, and over considerable areas of the central plateaus, are tracts of slight rainfall having a very poor type of pasture, not unlike the drier steppes.

In the Mediterranean region of winter rainfall the evergreen trees and shrubs adapted to summer drought are found.

The wetter monsoon lands of the south-east are covered by forests. In North China, Korea and Japan, these are of the warm-temperate type, and in Southern China, Indo-China and India, of the tropical variety, although there are parts having a smaller rainfall, in which savannahs, or mixed grasslands and woodlands are found. The Deccan is an example of this type.

In Ceylon, the Malay Peninsula and the East Indies the heat and rainfall are constant, so that dense tropical vegetation is met with, except in the plateau interior of Borneo where there are tropical grasslands.

THE NORTH-WESTERN LOWLANDS.

This vast triangular plain is drained to the Arctic Ocean by many large rivers, of which the Ob, the Yenisei and the Lena are the most important. On account of its size, the north-west lowlands contain several natural regions, which we will now discuss in order as they come from north to south.

THE TUNDRA.

We have already learned that in this *Region of Privation and Hunger* the summers are short, the winters long and cold, the rainfall is slight, and that as a result of these conditions the natural vegetation consists chiefly of mosses, lichens and stunted bushes.

The rivers which cross the tundra flow from south to north, so that in spring, when the thaw comes, their upper courses are supplied with water from the melting of ice and snow, whilst their lower courses are still frozen. This is the cause of large tracts being under water in summer, when millions of mosquitoes make life in these swampy lowlands quite unbearable, so that the inhabitants have to keep as far as possible to the higher parts.

The tundra has very little to offer to its inhabitants as a reward for their labour. The sparse vegetation is, fortunately, able to support herds of reindeer, but provides nothing for the support of human life except certain berries. The Ostyaks, Samoyads, Yakuts and other nomadic tribes are therefore compelled to depend for their food upon the reindeer, the fish which they catch in the rivers and sea, and the wild animals which they can hunt. A certain amount of hunting is possible, especially in winter, when it is the custom to migrate as far southwards as the northern edges of the great forest belt.

THE BELT OF NORTHERN TEMPERATE FORESTS.

In this broad belt of almost virgin forests, the trees are mainly conifers, although broad-leaved trees appear

towards the southern margins (see Fig. 77). It is the greatest hunting ground for fur-bearing animals in the whole world, although, except on its margins, it is almost uninhabited. The trapping is done chiefly by Ostyak and Samoyad hunters who live on the northern fringes, and whose settlements are regularly visited by traders.

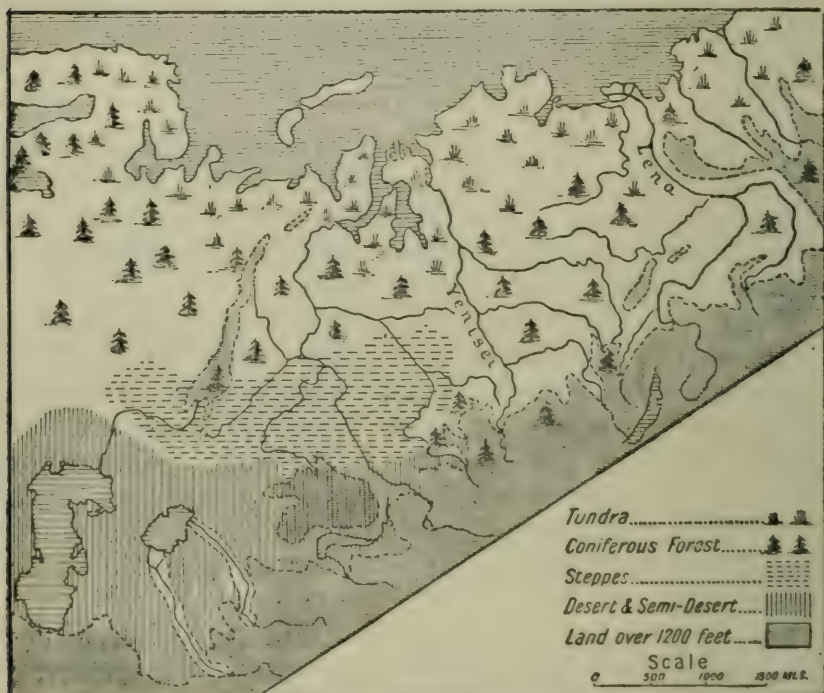


FIG. 77.—The north-western lowlands of Asia. Relief and vegetation.

In years to come, better means of communication will be the means of making lumbering an important occupation; but at present comparatively little is done, although a start has been made since the construction of the Trans-Siberian Railway. Towards the south the forests gradually thin out and give way to grasslands.

THE STEPPE.

The natural occupation of the inhabitants of these great areas of grass-covered lowlands is the rearing of

sheep, camels, horses, goats and cattle, and since the grass in a particular place is soon exhausted, it follows that the animals have to be constantly moved from place to place. Thus the steppe shepherd, like the tundra hunter, leads a nomadic life, at least in summer, for steppe dwellers invariably return to the same winter quarters. The site of the winter dwelling is very important, for it must be near to a reliable water supply, and in as sheltered a place as possible. Therefore a river valley is often chosen.

As a general rule, steppe dwellers despise a settled life, and glory in their nomadic existence. Their flocks and herds provide them with all they require, and therefore they are content.

The northern portion of the steppe is arable land—that is, it may be cultivated. It is in this region that great changes have been made in recent years. Settlers from places with a higher civilization have settled and brought with them the knowledge of the use of machinery, of irrigation, of the digging of deeper wells. In short, the modern settler in this part of the steppe knows how to live a settled life. Russian colonists are now raising enormous crops of wheat, oats, rye and root crops, for the soil is very fertile and the rainfall generally sufficient, although dangers such as long droughts and early frosts are by no means unknown. Cattle are also reared in large numbers, and the manufacture of butter, introduced by the Danes, is to-day one of the chief industries in Siberia. As more and more areas are developed and used for stock-keeping, dairy-farming, and the growing of cereals, the nomadic Kirghiz, who cling to their mode of life, are being pressed farther south and south-west towards the less fertile parts. The development of this portion of Siberia may be compared with that of the North American prairie. As in the latter region, the construction of railways has led to rapid progress.

Fig. 78 shows the great *Trans-Siberian Railway*. It passes through Omsk, the Siberian Winnipeg, the centre of a rich, black earth region in which wheat-growing,

dairy-farming and stock-keeping are important occupations. North-west of Omsk, at the confluence of the Irtysh and the Tobol, is the older and former more important town of *Tobolsk*. Unfortunately Tobolsk lies in a region of swamps, hence the modern railway, like the Mongol horsemen of old, followed the drier steppe lands farther south. Notice the position of both of these towns with regard to the command of the great caravan routes to the east via the Zungarian Gate. *Tomsk*, a rising Siberian city noted as the centre of a gold-mining



FIG. 78. — The Trans-Siberian and Trans-Caspian Railway.

district, stands some miles north of the main line. East of Lake Baikal the line forks, one branch reaching Stretinsk on the Amur river, and the other continuing across Manchuria via Harbin to the port of Vladivostok. The completion of the Amur valley line will give a means of reaching this point through Russian territory.

THE TURAN LOWLANDS.

These semi-desert and desert lands lie between the central highlands in the east and the Caspian Sea on the west, and stretch southwards to the Iran plateau.

Except in the north, they are enclosed by high mountains, which keep out rain-bearing winds. But since the mountains themselves receive rain and are often snow-capped, the Turan rivers rising in them are supplied with water. Of these, the Syr and the Amu flow into the Sea of Aral, and are the most important, but there are many which lose themselves in the sand.

About one-tenth is fit for settlement, and much of this is of a very poor type of pasture, and can be used for a short time only. In the river valleys a settled life, based on irrigation, is possible, and wheat, maize, wine, cotton and tobacco are produced, whilst the mulberry is grown in order to feed the silkworm. There is little sympathy or unity of action between the nomadic shepherds and the settled inhabitants of the oasis towns, and conflicts are not uncommon. This lack of cohesion is one of the chief reasons why Russia was able to add these lands to her empire with comparative ease. The Russian conquerors built railways, by means of which the chief towns in Turan could be reached with much greater speed and safety than was possible by caravan. Fig. 78 shows the *Trans-Caspian Railway*. After skirting the western margins of the Kirghiz steppe, which separates Siberia from Turan, the line reaches the valley of the Syr, and continues to *Tashkent*, the political and commercial centre of Turan. *Khokand*, reached by a branch line, is also irrigated by the waters of the Syr. *Samarkand* and *Bokhara* are in the valley of the Zarafshan, a river which loses itself in the sand. Bokhara is at the end of the river. Conquered by the Arabs in the eighth century, these ancient oasis cities, little *Regions of Increment* amidst *Lands of Wandering*, became Mohammedan centres of learning, but many of the famous buildings were destroyed during Mongol invasions of the thirteenth century. From Bokhara, the railway turns south-westwards, and runs to *Merv*, a very old route centre, from which a branch line runs southwards as far as the frontier of Afghanistan. Leaving Merv the main line winds across the desert, and has its terminus at Krasnovodsk, on the Caspian Sea.

EASTERN SIBERIA

Eastern Siberia is higher than western Siberia. It is largely an elevated region bordered on the east by the Stanovoi mountains, extending south-westwards to the forested highlands surrounding *Lake Baikal*, and drained by the Amur, Lena, and the eastern tributaries of the Yenisei. *Lake Baikal*, the deepest known fresh-water lake in the world—its depth in places reaching nearly one mile—is almost twice the size of Wales. It is shut in by steep mountain walls and occupies two long parallel troughs separated by a ridge, above which the water is at places less than twenty-five fathoms deep. Eastern Siberia lies wholly within the tundra and forest zones. The forests resemble those of eastern Canada, but industry is in a more backward state and at present is chiefly confined to trapping, except in the basin of the Amur where cereals are cultivated in forest clearings in the more fertile and sheltered valleys. *Yakutsk*, on the Lena, is the chief centre for the Siberian fur trade. Mining, especially for gold, is also an important industry. *Irkutsk*, the largest town in Siberia and the seat of government for eastern Siberia, is the chief centre. The town, a strange mixture of wretched hovels and splendid houses and buildings, has gained very considerably in importance since the construction of the Trans-Siberian Railway, which passes through it. *Vladivostok*, at the mouth of the Amur, is a terminus of the Trans-Siberian Railway, and is the chief port. It is unfortunate for Russia that its fine harbour is ice-blocked for about three months every year.

Siberia and the Turan Lowlands formed part of the pre-war Russian Empire. Nominally they are still Russian, but in the existing unsettled condition of affairs in Russia it is very difficult to say what form or forms of political control will emerge from the present chaos.

SOUTH-WEST ASIA.

PHYSICAL FEATURES AND CLIMATE.

South-west Asia comprises the broad belt of younger fold mountains enclosing the plateaus of Asia Minor and Iran, the alluvial lowlands drained by the middle and lower Tigris and Euphrates, and the ancient crustal block of Arabia.

The Mediterranean and Black Sea coastlands and Trans-Caucasia have winter rains and experience the Mediterranean type of climate. Mesopotamia has slight winter rains, and may be regarded as having a very dry climate of the same type. The plateaus have very little rain, and except for places where poor grasslands are found, they are deserts.

It is very evident that lands so diverse in relief and climate cannot be said to comprise one natural region. There is, however, one outstanding geographical feature of South-west Asia which has been its chief centre of interest from earliest times. These lands sit across the great land and water routes which pass from the Turan Lowlands, Europe and the Mediterranean on the one hand, to India, the Far East, and Australia on the other. These routes are of such great importance that they make it possible for us to consider the whole area as a unit.

THE GREAT ROUTES.

The earliest commercial relations of which we have any knowledge were between the ancient powers of Assyria and Babylon on the one hand, and Egypt on the other. A journey in a straight line between the two was impossible owing to the arid nature of the intervening land. Therefore a route along the Euphrates to the sea, along the coasts of Syria and Palestine and north of the Sinai Peninsula was probably taken at first, but afterwards shortened by a cut from the Euphrates via the oasis of Palmyra to Damascus. In connection with this ancient route, notice the position of the Phœnician

cities of Tyre and Sidon. It was natural that the world's first sea power should grow up there, and just as natural that that power should decay with the decline of the river powers which gave it birth, for Phœnicia lacked a productive hinterland of its own.

Now notice first the great route from the Indian Ocean via the Persian Gulf and the valley of the



FIG. 79.—S.W. Asia. Relief and routes.

Euphrates which reaches the Mediterranean in a gap between the highlands of Asia Minor and Syria. In this gap stands Antioch, a very ancient trading city. To-day it is superseded by the modern port of Alexandretta and by the important city of Aleppo, situated in the gap, but midway between the coast and the Euphrates. From Aleppo, routes strike across Asia Minor to Smyrna, Constantinople and Trebizond. The first two are now followed by railways. Trebizond and

the Black Sea are also reached by routes following the upper Tigris.

These great overland routes, and especially that from Constantinople via Aleppo to the Persian Gulf, are of vast importance, and their ownership or control was far from being one of the minor causes of the Great War. The rival water route via the Suez Canal and the Red Sea is commanded by Britain.

Third in importance, but perhaps first from the point of view of India, are the routes from the Turan Lowlands to the plains of India. Again and again have conquerors entered India by the two great north-west gates, the Khaibar and Bolan Passes (see Fig. 81), along routes indicated on Fig. 79.

There are many interconnections between the three sets of great routes mentioned above. They will be found marked in Fig. 79, and the most important will be mentioned later.

THE REGIONS OF SOUTH-WEST ASIA.

ASIA MINOR.

The coastal lands and the valleys opening westwards are well wooded; but the plateau lacks moisture and has very cold winters, so that there is little vegetation beyond grass, and parts are even deserts. The plateau dwellers are, therefore, largely nomads, who move about from place to place attending to the needs of herds of camels, horses, goats and sheep. *Angora*, in the centre of the plateau, produces goats whose fine hair is greatly prized for the manufacture of mohair cloths. In the valleys and plains the inhabitants follow settled occupations and produce Mediterranean fruits, tobacco, cotton, wheat and barley. Along the west coast, sponge fishing is an important industry, whilst, as should be expected from such a coastline, many men have become sailors. A considerable amount of silk manufacturing

is carried on, especially at *Brussa*, at the foot of Mount Olympus. Other manufactures are of cotton and wool, the latter being used in making fine "Turkey" carpets and rugs.

Smyrna, situated on a splendid harbour between two fertile valleys opening out to the Ægean Sea, is the chief port, its exports being representative of all the products of the country.

To the east of Asia Minor are *Armenia* and *Kurdistan*. They are rugged plateaus, crossed by high ranges which here come very close together, and sometimes contain fertile valleys. Notice the large lake Van, which is salt, and lies a little over a mile above sea-level. Pastoral occupations form the chief work of the inhabitants of these high plateaus, whilst *Erzërum*, the largest town, collects produce for export from *Trebizond*, on the Black Sea. Erzerum is the meeting-place of several routes (see Fig. 79). The town is so high and exposed that it was known as the "Siberia of Turkey."

TRANS-CAUCASIA.

The Caucasus mountains consist of a series of rugged parallel ranges, in which are numerous glaciers. Their southern slopes are densely forested and contain many valleys in which Mediterranean fruits and cereals are produced. The most extensive lowland is the lower valley of the Kur, which opens to the Caspian Sea. Tobacco, cotton and maize, as well as the vine, are produced here.

Baku, on the Caspian Sea, stands at the north of the plain, and is the centre of a very important petroleum area. Since it is on an enclosed sea, the oil has to be sent by tank trains and by pipe-line to *Batum*, on the Black Sea. Here it is pumped into oil-steamers and shipped abroad. *Tiflis*, the chief city, is beautifully situated on the precipitous cliffs of the ravines of the upper Kur. In addition to its position on the railway from the Caspian to the Black Sea, it also commands the easiest north and south route across the Caucasus

via the Dariat or Cross Mountain Pass. This route is very important, and has been followed by a splendid road.

SYRIA AND PALESTINE.

Syria and Palestine, lands full of interest on account of their Scriptural connections, lie along the eastern shores of the Mediterranean Sea. The former is a high plateau, whilst in Palestine, south of Mount Carmel, the highlands are farther away from the coast, leaving a fertile coastal plain everywhere less than 600 ft. above sea-level. Rising abruptly from the plains is the plateau of Judea and Samaria, which is not so high as that of Syria, farther north. The plateaus of Syria and Palestine slope gradually towards the east, where, beyond the Jordan, they form the Syrian desert. The greater part of the Jordan valley is below sea-level, the surfaces of the Sea of Galilee and the Dead Sea being 682 ft. and 1,291 ft. below sea-level respectively. These lakes occupy part of the floor of a rift valley (see Fig. 124).

In the Bible we read that Palestine was a land flowing with milk and honey. These products belong essentially to the steppe—the honey from the countless numbers of bees which cover the steppe flowers in the early summer. The Israelites came originally from the steppe, but they found in Palestine a land capable of producing many things besides milk and honey. They grew great quantities of wheat and barley on the coastal plains; they terraced the hillsides for the culture of the vine; irrigation works were carefully constructed, whilst the hill country was inhabited by prosperous shepherds. Under Turkish rule, however, irrigation works were allowed to fall into ruin, the hill terraces were destroyed, and there was little or no attempt made to construct modern roads.

Beirut, the chief modern port, is connected by rail with *Damascus*, the capital of Syria. This city, the oldest in the world, is an oasis made by the waters of a small river at the base of the Anti-Lebanon mountains. It owes its importance to its control of

routes—eastwards to Mesopotamia, southwards, via the Pilgrims' Railway to Medina and Mecca, and westwards to the coast of Palestine.

The ancient city of *Jerusalem*, the capital of Palestine, has a very central position, and one that could be easily defended, for it is surrounded on three sides by deep ravines. From Jerusalem a railway runs to its port, Jaffa, but at present it has no direct connection with the Medina railway owing to the difficulty presented by the Jordan rift valley. The harbour at Jaffa is so poor that all passengers and goods have to be landed in surf-boats.

MESOPOTAMIA.

Upper Mesopotamia, which was roughly the ancient land of Assyria, has a much more varied relief than the lowlands of southern Mesopotamia, which comprised Babylon. It is also drier. These geographical facts made the Assyrians a virile pastoral people and decreed that in the end they would overthrow the Babylonian cultivators.

The Euphrates and the Tigris rise amidst the snows and wilds of the Armenian mountains. Before reaching the Persian Gulf they join, and flow through a region rendered swampy by uncontrolled flood waters. Close to the rivers, where irrigation is rendered easy, fields of cotton, wheat, tobacco and maize are found, whilst sugar and date palms are important in the lower valley. The rainfall, however, is so small that without irrigation agriculture cannot be carried on, and since the same story of Turkish neglect has to be told of this land as of Syria and Palestine, the present condition of the greater part of the country is little better than a poor steppe land in which nomadic Arabs and Kurds pasture their flocks. There is no doubt that, given satisfactory ownership, Mesopotamia would once again become one of the gardens of the world. As in Egypt, great barriers could be put across the rivers in order that water may be held up for use when the rivers are low.

Mosul stands at the navigation limit of the Tigris, and is built mainly upon rising ground so as to be above the level of the river floods. Its name means "Central Gates," and was bestowed upon the city because it is situated at the intersection of routes from the Black Sea to the Persian Gulf, and from the Mediterranean Sea to the Caspian. The ruins of the ancient Assyrian capital, Nineveh, are on the opposite bank of the river.

Baghdad, famous in the *Arabian Nights*, is a walled city, standing on both banks of the Tigris, at the limit of navigation by large river boats and also at the point where the Tigris and the Euphrates come near to each other. The latter fact is of importance, as it may be possible to unite the rivers by canals, used for navigation as well as irrigation. A tributary from the Zagros Mountains enters the Tigris at Baghdad. This adds greatly to the importance of the city, for a route to Persia follows its valley. South of Baghdad, but on the Euphrates, are the ruins of Babylon.

Basra stands near the Shat-el-Arab, the combined Tigris and Euphrates, and is the natural sea-port of Mesopotamia. It is built about a mile from the river; but the district is so cut up by canals that all communication takes place by water. The surrounding country is dreary in the extreme, owing to the extent of the marshes, which are a source of malaria, but near Basra itself there are extensive plantations of date palms.

ARABIA.

Arabia is one of the driest lands in the world. The higher districts, especially those of the south-west and the centre, receive slight rains, and on that account pastoral occupations can be carried on there; but elsewhere the land is practically rainless. Except in the south-west, there are no permanent streams, only wadis, or channels, which are supplied with water after the occasional rains, but even then the streams never reach the sea. There are, however, oases where underground sources of water can be reached, or where springs occur, and in these, date palms and cereals

can be cultivated. Such oases are found in the valleys of the Nejd plateau, where rain falls during spring and autumn in sufficient quantity to give a covering of grass for a short time. It is on account of this that the Nejd region is famous for its breeds of horses, camels, donkeys and sheep.

In Yemen, in the south-west, there are permanent streams flowing to the Red Sea, and, owing to the elevation, the high parts enjoy a warm, temperate climate. Fields of wheat and fruit trees are numerous, and coffee is an important product. This is grown on the lower south-west slopes, where the climate is hot and moist because mists from the sea are common.

The remainder of the west coastlands, and those in the south, are hot and dry, and almost uninhabited. In the region of the Oman highlands, in the south-east, some rain falls, and there are parts which are suitable for pasture. Notice the Bahrein Islands, in the Persian Gulf. They are British, and have important pearl fisheries. Another British possession is *Aden* in the south-west, more than one hundred miles from the entrance to the Red Sea, but sufficiently near to be of great value as a naval and commercial depot. It is built in the crater of an extinct volcano. Rain falls very irregularly, often at intervals of more than a year, so that fresh water has to be obtained by means of the evaporation of sea water. In addition to this, large tanks have been cut in the rock, in order to receive and store the storm-brought rains.

The most interesting town in all Arabia is *Mecca*, famous as the birthplace of Mohammed. Every year it is visited by thousands of pilgrims, who make long journeys to the tomb of the prophet. The port of Mecca is Jiddah. *Medina*, north of Mecca, contains the tomb of Mohammed, and is also much visited by pilgrims. It can now be reached by railway from Aleppo and Damascus. Apart from this line, the chief means of communication in Arabia are naturally by means of caravans, and the most important routes taken by these converge upon Mecca (see Fig. 79).

IRAN.

The Iran plateau is really a depression bounded by mountains. There are marked climatic contrasts between (*a*) the Persian Gulf coastlands, where the climate is unhealthy, owing to a damp heat, with a low rainfall; (*b*) the greater part of the plateau, where there are extremes of winter cold and summer heat, together with a small rainfall; and (*c*) the lands bordering the Caspian Sea, where the climate is of the warm temperate type. In the latter region there is ample rainfall, and the slopes of the mountains are forested.

The leading occupations are dependent upon the climatic conditions. On the plateau the poor pasture supports goats, sheep and camels, and pastoral products are of chief importance, and have been the means of making Persian carpets and cloths famed the world over. In the belt at the inner base of the marginal mountains, where the rivers disappear underground, owing to the porous nature of the limestone forming much of the plateau, an elaborate system of underground canals, or *kanats*, partly natural, partly artificial, is found. By means of these many tracts which would otherwise be desert are irrigated and have become oases producing rice, tobacco, maize, cotton, etc. Along the south coast the date palm is the typical product, whilst in the lowlands bordering the Caspian Sea, silk, cotton and sugar are produced.

The mineral wealth of Iran is considerable, but is little worked. Within the last few years valuable petroleum deposits have been found in a zone extending in western Persia from Kurdistan to the Persian Gulf. These are being energetically exploited by British companies.

Communication in a region like this is very difficult, and depends chiefly on the use of camels and mules, for, excepting the roads leading from Teheran, the Persian capital, to the Black Sea, there are no roads upon which wheeled conveyances can be used with ease. The two great caravan routes avoid the central depressions, of which the two largest are the Great Salt

Desert in the north-west, and the Seistan depression in the east, and follow the belt at the foot of the mountain (see Fig. 79).

Teheran, which lies at the southern base of the Elburz mountains, is the Persian capital. It commands several important caravan routes. One of these passes through *Ispahan* and *Shiraz*, both oasis cities, to *Bushire*, the chief port of Persia. A second crosses the Zagros Mountains and reaches Baghdad. A third goes westwards to Tabriz and the Black Sea, and eastwards to Meshed, famed for its shawls and carpets, Herat and Afghanistan.

Kabul, the capital of Afghanistan, a land of high mountains and deep valleys, is a city of great strategic importance, since it commands the route to the Khaibar Pass. This pass, which does not follow the Kabul river, leads to the plains of north-west India, and can be held by a few good marksmen against a large number of attackers, for in places it is very narrow indeed. *Kandahar* and *Quetta*, the former in Afghanistan and the latter in Baluchistan, are on another route leading to the plains of the Indus via the Bolan Pass.

THE POLITICAL UNITS OF SOUTH-WEST ASIA.

The political control of those parts of South-west Asia which formed part of the Russian and Turkish Empires has very much changed as the result of the Great War. These changes, so far as is at present known, are indicated on Fig. 80. It should be noted that the exact boundaries of these states have not been determined, and it is more than likely that some of them will change before normal conditions are reached.

The collapse of the Central Russian Government and the difficulty of communication across the Caucasus led to the secession of the Trans-Caucasian peoples, and their subsequent formation into three separate states. Round Erivan an *Armenian State* has been formed, and it is almost certain to extend its territory so as to include some former Turkish lands. The area round

Tiflis and Batum has become the *Republic of Georgia*, whilst on the shores of the Caspian, with Baku as capital, the *Republic of Azerbaijan* has been formed.

The peace treaty demands that Turkey shall recognize the independence of *Armenia*, *Mesopotamia*, *Syria*, *Palestine* and the *Hejaz*, and that she shall give autonomy to *Kurdistan*, with the possibility that ultimately there may be set up an independent Kurdish State. The city and district of Smyrna have been

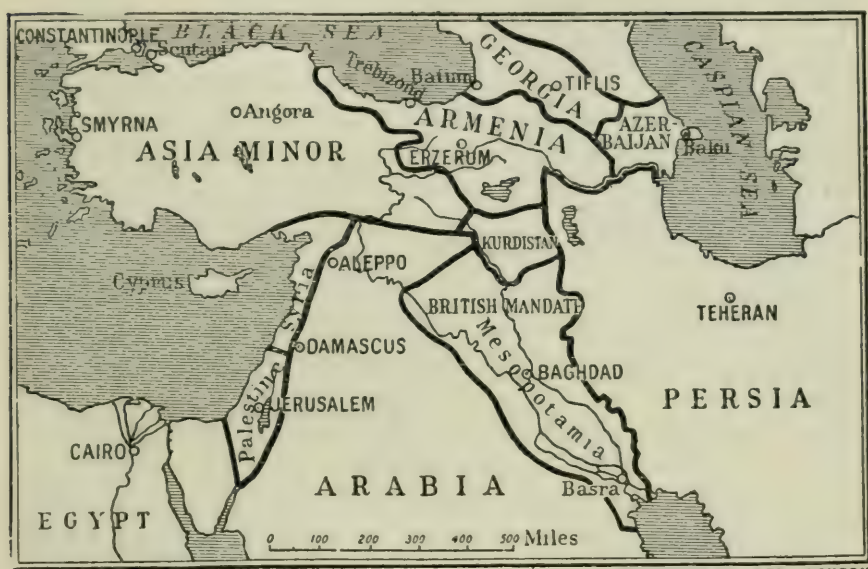


FIG. 80.—The new states of south-west Asia.

handed to Greece, and their final fate is deferred for five years; whilst the creation of the "Zone of the Straits" (see pp. 278 and 282) further reduces Turkish power. It is thus seen that all that is left to Turkey of her former vast Asiatic possessions is a part of Asia Minor. Under mandates from the League of Nations, Britain will guide the affairs of Mesopotamia and Palestine, and France those of Syria. Mesopotamia is to have a native government with an Arab president, whilst an effort will be made to create in Palestine a national home for the Jewish people.

The political units of Iran remain unchanged. *Persia* and *Afghanistan* are independent, and *Baluchistan*, a stony desert with a few oases, forms part of the British Indian Empire. All three occupy positions of great political and strategic importance, especially was this so in the days when they were "buffer states" between powerful Russian and British interests.

INDIA AND CEYLON.

PHYSICAL FEATURES.

The Indian Empire includes not only the great peninsula south of the Himalaya mountains, but Baluchistan, which forms part of the Iran plateau, Assam and Burmah.

An examination of the physical map will at once disclose the following physical units:

1. The great mountain barrier in the north-west, the north and the north-east.

2. The extensive plains of the Indus and the Ganges.

3. The triangular plateau of the Deccan, of which Ceylon is a detached portion.

1. *The Northern Ranges*.—The Himalayas are a series of parallel earth folds which rise, ridge behind ridge, until the highest central crest is reached. This central ridge, known as the Snowy Himalayas, contains all the highest peaks, including Mount Everest, the highest mountain in the world. North of the western Himalayas, and separated from them by the upper Indus, are the Karakoram mountains, an eastern continuation of the Hindu Kush.

In the north-west of India, where the Iran plateau, bordered by the Sulaiman and Hala mountains, rises above the plain of the Indus, the mountain barrier is not so continuous as in the Himalaya region, and there are two passes which give fairly easy access to India from the north-west. They are the Khaibar and Bolan Passes (see Fig. 81).

In the north-east, the Himalayan ranges bend south and traverse Indo-China.

2. *The Indo-Gangetic Plain.*—This extensive lowland has been very slowly built up by the sediment brought from the mountains by rivers. It is worthy of note that

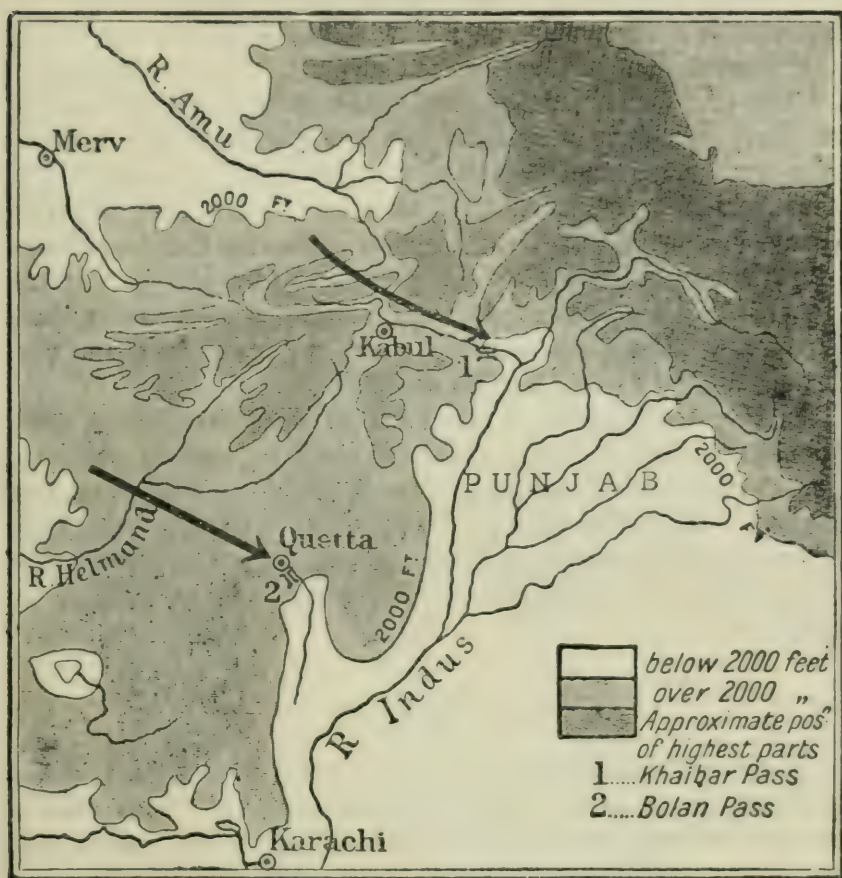


FIG. 81.—The north-west gates to India.

the three great rivers of India, the Indus, Ganges and Brahmaputra, have headstreams (in the case of the Ganges one of its tributaries) which have their sources north of the Himalayas, about the centre of the system (see Fig. 87). The rivers reach the Indo-Gangetic Plain by means of difficult and often inaccessible gorges. It

is very probable that the rivers existed before the mountain ranges, and that the latter were uplifted so slowly that the rivers were able to maintain their north and south direction by cutting gorges of constantly increasing depth. At their mouths they are building up great deltas, thus extending the area of the plain.

3. *The Deccan*.—We have already learned that the Deccan is a fragment of an ancient southern continent, and that it is a plateau so tilted that it presents a steep face to the Arabian Sea, and has a long slope to the Bay of Bengal, along which are coastal lowlands much wider and more extensive than on the west (see Fig. 75). The western edge of the Deccan forms the Western Ghats (= steps), and its eastern margins the lower and much more broken Eastern Ghats. The longer Deccan rivers, as, for example, the Godaveri, Kristna, and Cauvery, flow eastwards, their valleys having very considerably dissected the plateau.

In the north-west of the Deccan there are large areas covered with a very rich black soil, made by the decomposition of the basalt rock which is found in that region. This soil can hold moisture long after the rains have ceased, and as it is much used for the production of cotton, it is often called "the black cotton soil of the Deccan."

CLIMATE.

The great mountain barrier to the north of India is a climatic as well as a physical barrier. The winter, or cool season, winds of India blow from the north-east, and those of summer from the south-west, but it does not appear that the former have come from the heart of the continent, or that the latter are making for the large low pressure system north of India. It will be seen from Fig. 82 that the coldest part of India in January is in the north-west, *i.e.* the middle Indus basin and the Thar desert. Between January and May the heat is gradually increasing, until at the end of May the region of greatest heat is the centre of the peninsula.

At this time of the year the sun is seen overhead at noon in the northern hemisphere nearer and nearer the Tropic of Cancer every day, so that, in July, the region having the highest temperature is the same area which was coldest in January. This, of course, means that this

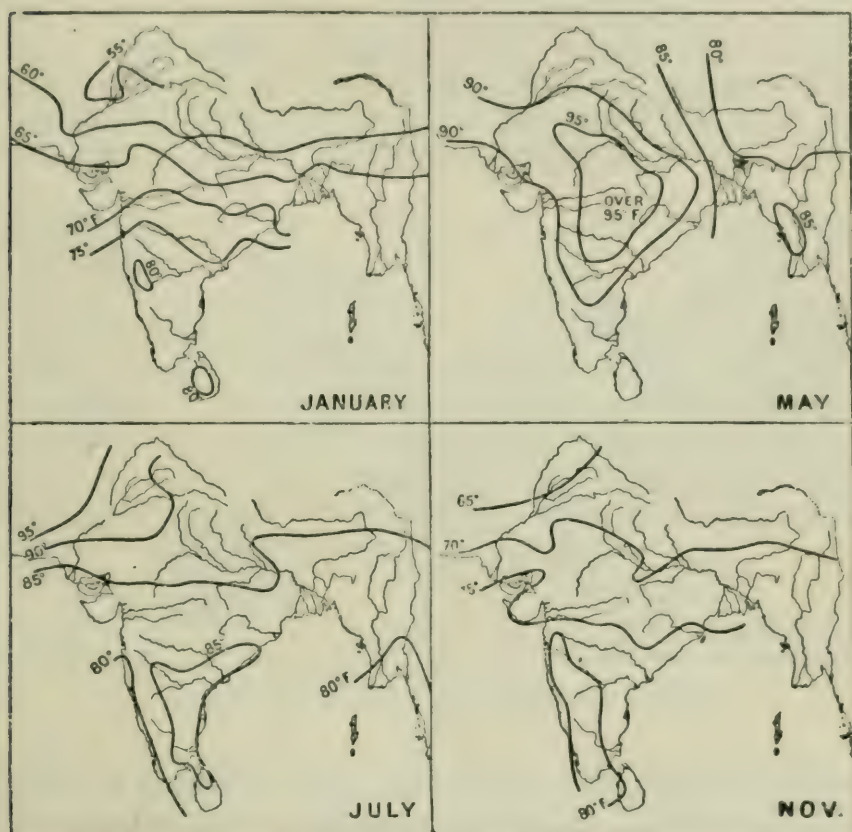


FIG. 82.—India. Temperature maps.

region is a centre of high pressure in January, and of low pressure in July (see Fig. 83). Now it is from this local area of high pressure that India's winds blow in the cool season, and towards this area of low pressure that they blow during the wet season.

During January and February India has its *cool weather season*, and in these months there is a movement

of air from the north-west along the valleys of the Indus and the Ganges. Over the ocean these winds, obeying Ferrel's Law, are deflected to the right and become N.E. winds—in fact, the N.E. Trades. Lying between the two great air currents, the Deccan, at this time of the year, receives few winds and is dry and dusty. March, April and May are the months of the *hot weather season*. The northerly migration of the sun causes India to be slowly heated, until at the end of May the heat, especially on the Deccan, is almost unbearable. The whole country is baked, the grass is

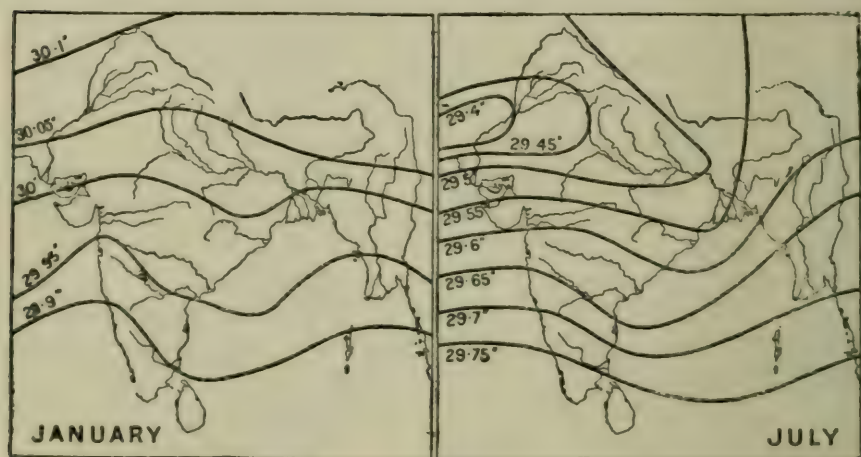


FIG. 83.—Pressure maps for January and July.

withered, even man languishes, and everything is ready for the coming of the monsoon. Some rain falls in the south and on the mountains, but in insufficient quantities to relieve the general state of depression. The region of greatest heat moves to the north-west, the winds of the earlier part of the year cease to blow, and, early in June, the monsoon winds reach Bombay. From June to October is the *Season of the South-west Monsoon*. The coming of the monsoon is heralded by cyclonic storms of great violence, but they are soon over and calm reigns again, only to be broken by other storms, which usually occur about every fortnight. The

periods of calm between the great storms are very important, for immediately following one of them the farmers put their plants in the ground (especially rice and indigo), so that they may be firmly rooted before the next storm arrives. What has really happened is, that the Doldrums low-pressure area has moved as far north as northern India, so that the S.E. Trades cross the equator (see Fig. 84) where they come under the influence of deflection to the right, and reach the Western Ghats as S.W. winds. Here they are suddenly forced to ascend, and, since they have come

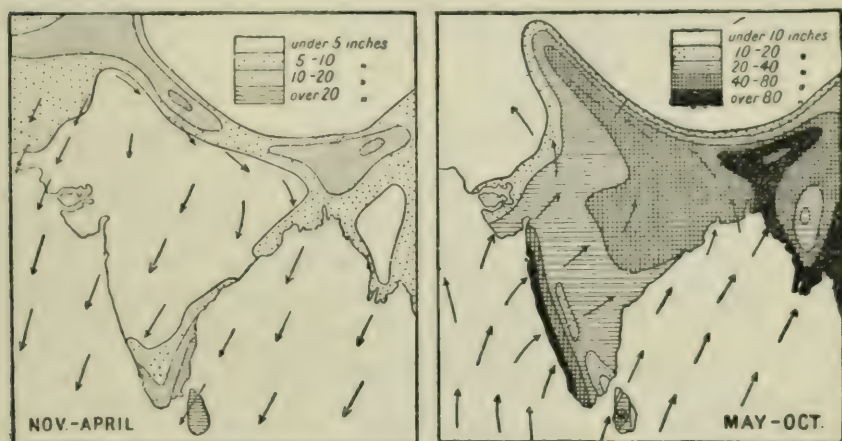


FIG. 84.—India. Winds and rainfall.

over thousands of miles of water, the rainfall is tremendous. Indeed, so much is liberated that the winds continue eastwards across the Deccan as dry "Chinook" winds. It is owing to this fact that the Deccan is indifferently watered, and is often troubled by famine. This danger has been somewhat mitigated by the construction of tanks or reservoirs for the storage of water. It must also be noted that the full force of the south-west winds is not felt north of the Gulf of Cutch, so that even at this season little rain is brought to the lower Indus basin, whilst owing to the low elevation there is less precipitation from those sea winds which it does receive.

The air currents passing up the Bay of Bengal water the greater area. Some of the winds blow towards the hills of Assam, and enormous quantities of rain fall there, Cherrapunji having a world's record—a mean annual rainfall of 460 in., or nearly 39 feet. Other currents, making for the low-pressure area in the north-west, pass along the Ganges valley, dropping rain all the way. Very gradually these conditions change, and November and December may be named the *Season of the Retreating Monsoon*. The north-east winds begin to gain control in the north, and the south-west winds retreat farther and farther south; but before they finally disappear they bring rainfall to the south-eastern margin and to Ceylon.

NATURAL VEGETATION AND CULTIVATED PLANTS.

Natural Vegetation.—The Western Ghats, the Himalayas and the mountains of Assam and Burmah have a heavy rainfall, and this results in dense forests on their lower slopes. Of course elevation has a very important effect on the type of natural vegetation. This may be illustrated from the vegetation of the Himalayas. (See Fig. 85 which explains itself. Note the scale of feet at the side.)

The monsoon winds also blow up the valleys of the Nerbada and Tapti, and the heavy rains which fall account for the dense forests in the valleys of these rivers. The delta of the Ganges-Brahmaputra, the Sundarbans, is also a densely forested swamp, inhabited by tigers, deer, wild boars, crocodiles and reptiles. Much of Ceylon, too, is forested.

On the borders of the desert of Thar there are considerable areas where, owing to the light rainfall, agriculture cannot be carried on, although it is possible to rear cattle, as the prevailing vegetation is that of poor grassland. Much of the Deccan is savannah, due to the lack of water, for it must be clearly understood that, as the greater part of India receives rain in summer only, forests will not be found in those places where

the summer rain is not sufficient to keep the soil moist at all seasons.

Cultivated Plants.—Fig. 86 shows the distribution of the leading vegetable products of India. It will be seen that *rice* is grown chiefly in the well-watered lowlands of the Ganges basin and along the coastal plains bordering the Deccan and eastern Burma. *Tea*,

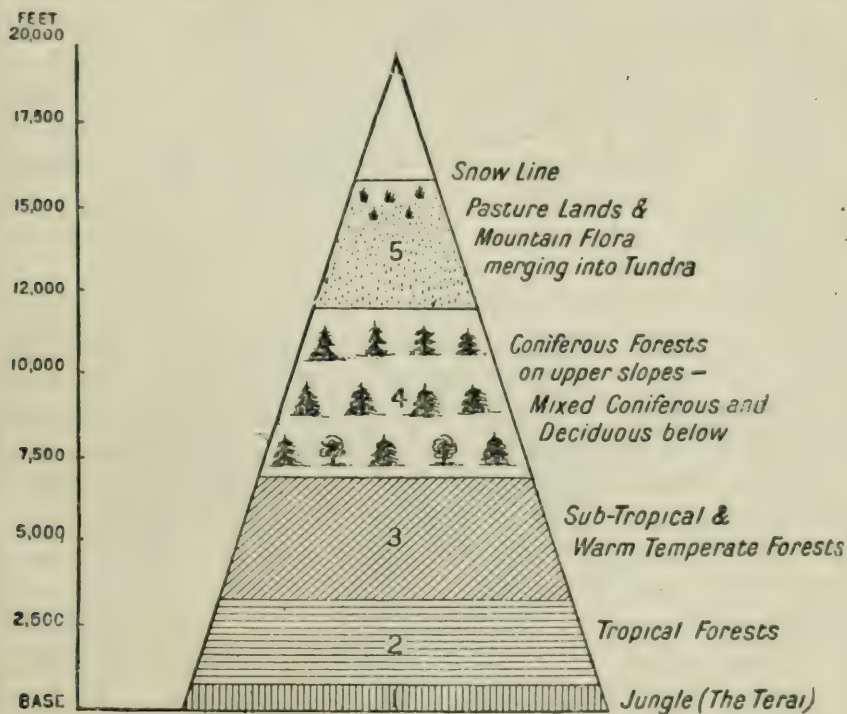


FIG. 85.—The vegetation belts on the southern slopes of the Himalaya Mountains.

like rice, requires considerable heat and a heavy rainfall, but, unlike rice, the water must not stay around its roots. It is, therefore, grown on hill slopes and on well-drained plains. Most of the tea imported into the British Isles is produced on the hills of Assam and in Ceylon. *Coffee* cannot thrive in places where the winters are severe, and is, therefore, chiefly grown in southern India and in Ceylon, although in the latter island it has made way for other products in recent

years. *Cotton* is also a very important product. As will be seen from Fig. 86 its cultivation is confined chiefly to those parts of the Deccan which are covered by the fertile black soil. Indian cotton is largely exported from Bombay, which is also a rising cotton manufacturing centre. *Indigo* and *opium* are not produced to the same extent as in former years. From the indigo plant a blue dye can be obtained, but since the discovery and manufacture of chemical dyes, an industry best developed in Germany, the demand for indigo has fallen off considerably. *Opium*, made from poppy seed-pods, was formerly largely exported to China. *Jute*, India's most valuable export, is confined to the lower valleys of the Ganges and the Brahmaputra and to the Sundarbans, where the land is fertilized by the river floods. One result of the production of jute in this part of India has been to make Calcutta a very important jute manufacturing city, about two hundred thousand people finding employment in its jute factories.

The coal used in the Calcutta jute factories, in the cotton mills of Bombay, Allahabad, Jubbulpore, and Nagpur (see pp. 320-323) is chiefly mined in coalfields lying along a semicircle passing through the headwaters of the Damodar, Son, Mahanadi and Godavari rivers, the most valuable being around Raniganj, some 100 miles north-west of Calcutta.

Millet, extensively grown as a food grain, is generally confined to those regions which, on account of lack of moisture or too poor soil, are not suitable for rice or wheat. *Flax* is very widely grown, and oil seeds form one of the chief exports of the country. In hot countries like India, the fibre does not develop sufficiently well to be used for manufacture, but the seed (linseed) is more abundant than in temperate countries, in which the fibre is of more value than the seed. Ceylon produces *rubber* and *cinchona*, which have been introduced from South America with conspicuous success. Rubber is cultivated on the lowlands, and cinchona, from which quinine is obtained, on the hill slopes. Other products of Ceylon are coconuts, cacao and cinnamon, but tea, already

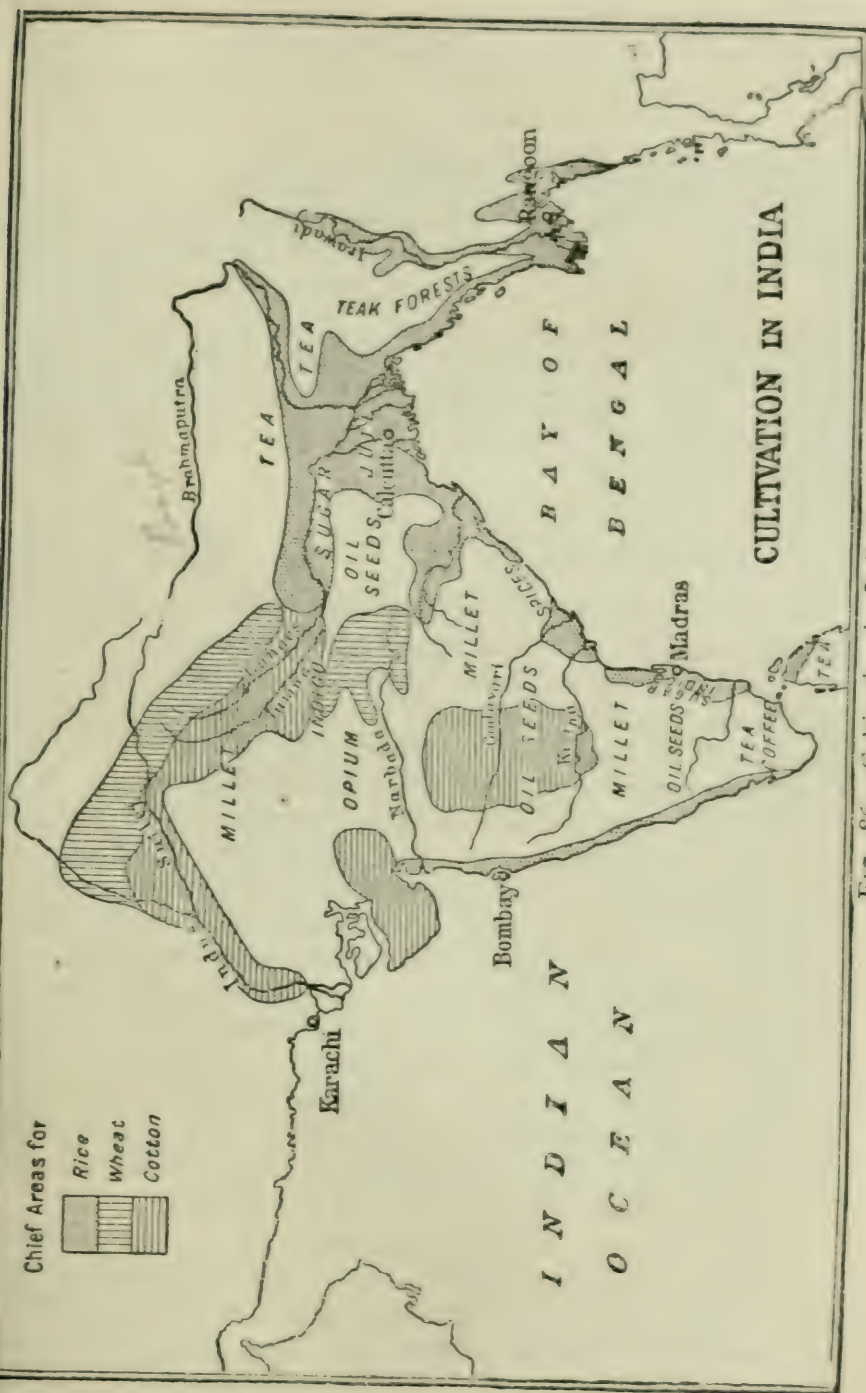


FIG. 86.—Cultivation in India.

mentioned, is its chief export. As will be seen, Ceylon's products are those of a more equatorial type of climate than those of India, and it is on this ground that it is included with the South-Eastern Archipelago in the classification of natural regions (see Fig. 1).

We have left *wheat* until last because it is grown in India as a winter crop; all the vegetable products mentioned above are summer crops. Now India receives little rain in winter, so it is evident that much of the water required must be obtained by irrigation methods, although it is the rule to plant the seed just before the summer rains cease. The chief wheat-producing areas are the Punjab and the well region of the upper Ganges.

COMMUNICATIONS, CITIES AND PEOPLE.

In recent years India's commerce with the outside world has developed very greatly, and this is in no small degree due to the construction of railways. Formerly, rivers had been the chief means of communication, but these were not of great value, except in the rivers in the Ganges system. Neither were there good roads, as in the Indo-Gangetic Plain there is a great absence of road-making materials, and in other parts the irregularity of relief, and the fact that many roads become impassable during the rainy season, also prevented much intercourse. The chief beasts of burden are elephants, and humped cattle, and they offer a very slow and expensive means of transport. Thus it was that the making of railways made many changes and especially gave a help to trade. Fig. 87 shows the chief railways of India marked on a map which shows relief. As most of the chief cities of India are on these railway routes, we can learn about them whilst following the railways.

Let us begin at *Calcutta*, the only city in India whose population exceeds a million, and until a few years ago the capital. It is built on the Hugli, a distributary of the Ganges, is eighty miles from the sea, and is the outlet of, and the gateway to, the rich Ganges lowlands.

Leaving Howrah, on the opposite side of the river, the East Indian Railway traverses the plains of the Ganges, passing through Patna, Benares, Allahabad, Cawnpore,

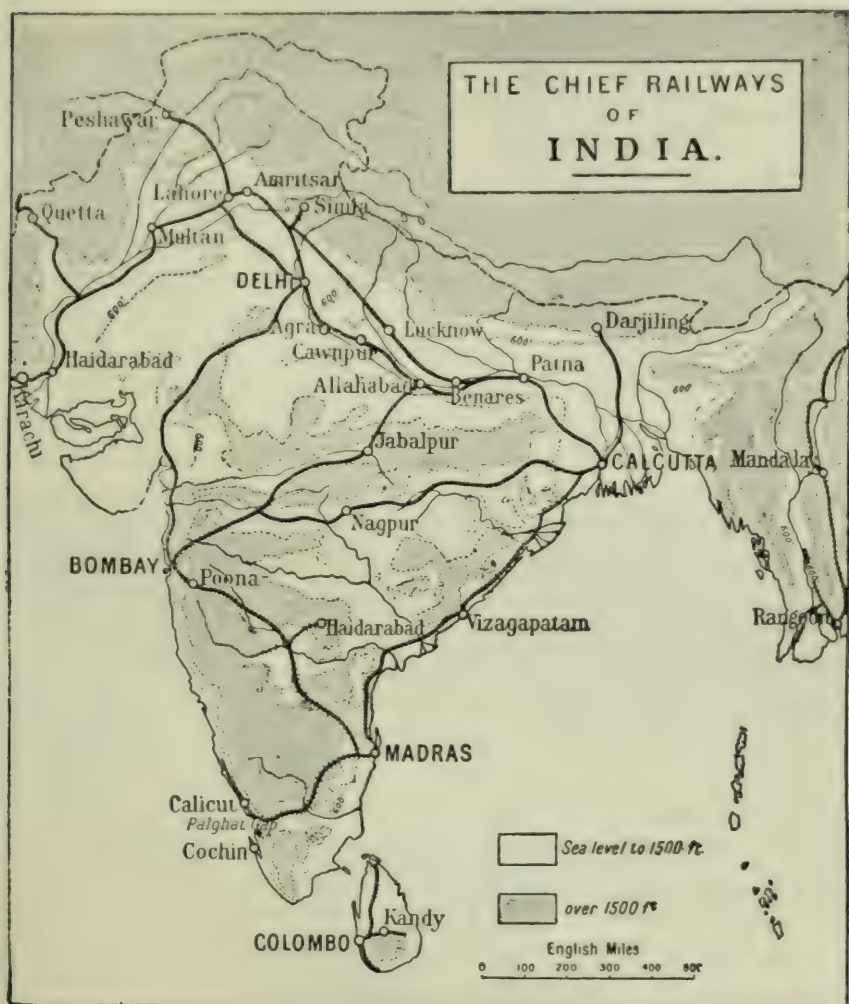


FIG. 87.—India. Relief and chief railways.

Agra, Delhi, and before reaching Lahore makes a junction with the North-Western Railway, along which the journey can be continued to Peshawar (Figs. 87 and 88). *Patna* is the centre of a rich rice-growing region, and

also manufactures opium. *Benares* is the most sacred city of the Hindus, and is dependent chiefly on the large number of pilgrims who visit it. It is built high above the river, to which the descent is made by a series of ghats or steps. *Allahabad* stands at the confluence of the Ganges and its chief tributary the Jumna, a position which made it important before the construction of railways. It is now a great railway centre, for it is at the junction of the railways from Calcutta, Bombay and Peshawar. It manufactures cotton goods. *Cawnpore*, on the Ganges, has become a modern manufacturing town, making cotton and leather goods. It will always be remembered as the scene of the horrible massacre which took place there during the Indian Mutiny. *Lucknow*, on the Gumti, is also remembered in connection with the prominent part it took during the Mutiny. It was the ancient capital of Oudh, and was formerly famous for its native manufactures, particularly of chased gold and silver. *Agra*, on the Jumna, is situated in a very rich agricultural district. It was formerly one of the chief cities of the Mogul Empire, and possesses some splendid monuments of the Mogul rule, the most beautiful being the famous Taj Mahal, which is esteemed the finest work of art in India. Farther up the Jumna is *Delhi*, since 1912 the capital of India. The map will show that it stands at the eastern edge of the higher land (known as the Delhi ridge), which forms the watershed between the Indus and Ganges tributaries. It is also in the comparatively narrow gap between the Thar desert and the Aravalli Hills on the one side, and the Himalayas on the other. For these reasons, Delhi, historically the North-western "gate" city of the Ganges plain, is well situated for control over *both* great river basins of northern India, and was the capital of several earlier empires than the British. It was for these reasons, together with its good rail communication and its nearness to Simla, the Himalayan hill station, that it has superseded Calcutta as the capital (Fig. 88).

Continuing our journey to Peshawar, the next important town we should pass through is *Lahore*, situated

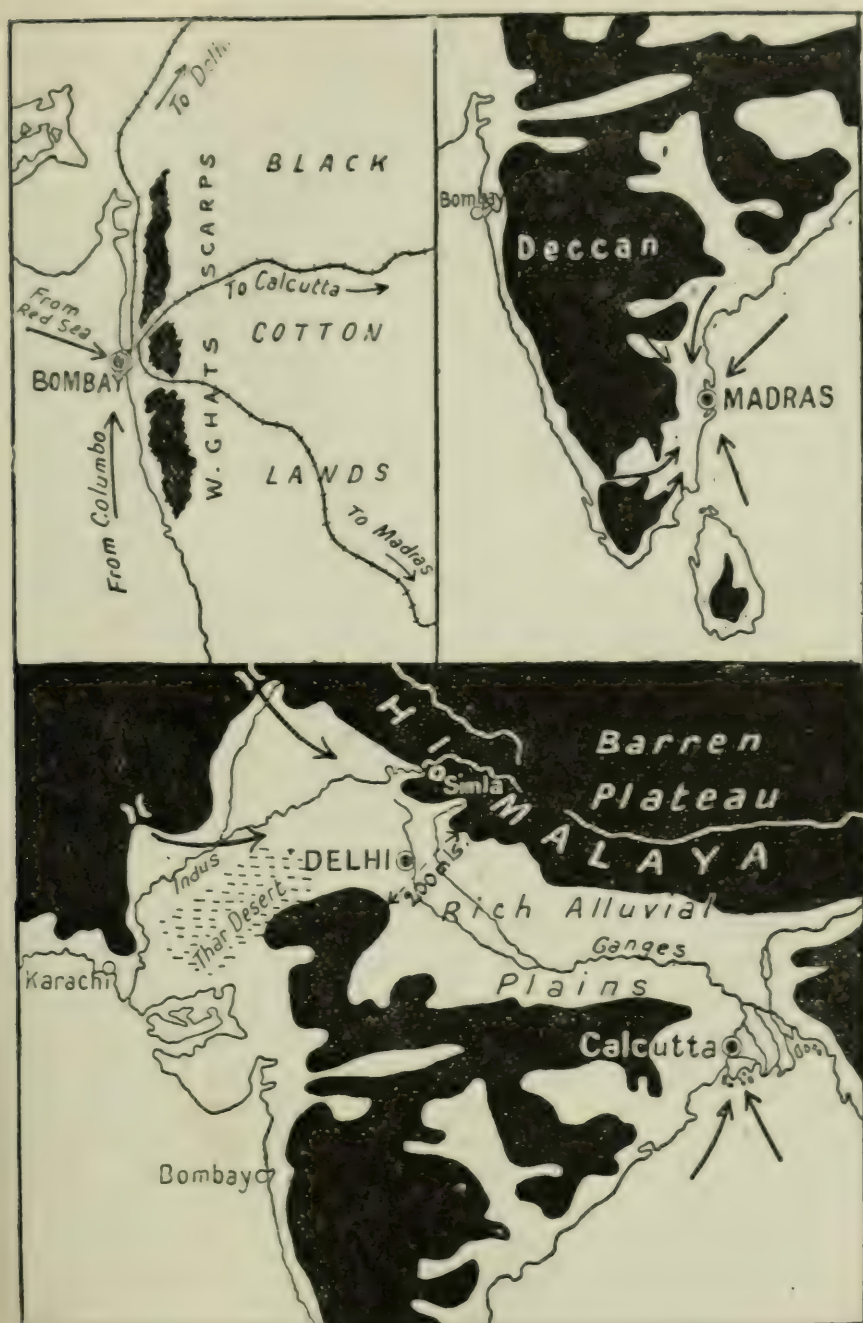


FIG. 88.—Sketch maps showing the importance of the sites of certain cities.

about a mile from the left bank of the Ravi. It is the largest city in the Punjab, and is the centre of a region producing large quantities of wheat. *Peshawar* is a strongly fortified city on the Kabul river, near the entrance to the famous Khaibar Pass, which leads to the Afghan capital, and beyond to the plains of Turan. Let us now return to Lahore, and from that city trace the North-Western Railway as it follows the Ravi towards *Multan*, a city so placed as to be near the confluence of the Punjab rivers. It is also on the margin of the desert of Thar. These factors have made it a good collecting centre for the wheat grown in the Punjab, as well as a meeting-place of important routes. Leaving Multan, the railway follows the Indus, which receives no large tributaries in its lower course, and runs to *Karachi*, the chief port for the produce of the Indus delta, and for the Punjab wheat. Note its situation to the west of the delta. This line has an important branch which goes a little beyond *Quetta*, a fortress city guarding the western entry to India, by way of the Bolan Pass.

Now let us consider the routes which radiate from *Bombay*, the second largest city in India. The city is built on an island, and the passage between the island and the mainland gives a splendid natural harbour. Although England has owned Bombay since the days of Charles II, it was the opening of the Suez Canal which made it of first-class importance, for it is in a very favourable position for trade with Europe. We have learned that the Western Ghats present a very steep face to the Arabian Sea, and it will at once be seen that the construction of railways from Bombay to the Deccan was no light task. But the growth of Bombay depended upon means of quick communication with Calcutta and the Ganges basin, and a railway, which climbs the Ghats by a very difficult zigzag course, has been built, whilst another follows the coastal plains northwards via Surat, and continues its journey between the Aravalli Hills, and the south-eastern edge of the Thar desert to Delhi, the capital (see Figs. 87 and 88).

Leaving Bombay by the Great Indian Peninsular Rail-

way, the train climbs the zigzag railway line on its way to the Deccan plateau, and after having crossed the upper Tapti, follows the upper Narbada to *Jubbulpore*, an agricultural centre in which several cotton mills have been recently established. From Jubbulpore the line continues to Allahabad, the journey to Calcutta being completed by means of the East Indian Railway. A shorter but more difficult line between Calcutta and Bombay passes through *Nagpur*, another town which owes the construction of its cotton mills to the cotton-producing region in which it is situated. Another route of the Great Indian Peninsular Railway runs south-eastwards from Bombay via Poona, to Madras. Poona, in modern times, is to Bombay what Simla and Darjeeling are to Delhi and Calcutta.

Madras, the third city in India, was one of the earliest British settlements, and it was from there that British influence spread westwards to the Deccan. It is the port for the rich plains of eastern India, but it is greatly hampered by not having a natural harbour, for it stands on a surf-beaten coast. It is connected with Calcutta by a line following the east coast plains, and with the west coast by the Madras Railway, which utilizes the Palghat Gap, the only break in the Western Ghats between the mouth of the Tapti, and the extreme south of India (see Fig. 88). The small port of *Calicut*, once a Portuguese trading settlement, commands the gap.

The large and important native state of Kashmir is not served by railways. It lies up in the western Himalayas, and, owing to its elevation, has a climate entirely different from that of other parts of India, as it is free from the great summer heat of the Deccan and the northern plains, whilst it is not so cold and bleak as the plateaus of Pamir and Tibet. It is crossed by lofty mountains, and contains many deep valleys, the most important of which is the Vale of Kashmir, the upper valley of the Jhelum, one of the Punjab streams. The capital is *Srinagar*, which produces the famous Kashmir shawls, made from goats' hair. From this city, caravans

start for Leh, and from there cross the Karakoram Pass on their way to Chinese Turkestan or Tibet.

In Ceylon a railway has been built from Colombo to the north of the island, whilst a branch climbs to Kandy, the old capital. *Colombo*, the capital and chief port of Ceylon, is situated on a splendid artificial harbour, protected from the south-west monsoon by breakwaters. It is on the west coast, and is not only important as the port for the valuable products of Ceylon, but is a port of call on the great routes from Europe, via the Suez Canal to Calcutta, Singapore, and the Far East on the one hand, and to Australia on the other. It has also a considerable trade with East and South African ports.

In Burma two railways leave Rangoon, one following the Irawadi, and the other striking northwards and reaching the same river at Mandalay (see Fig. 87). The latter is the more important. Notice that these railways follow the general north and south direction of the mountain ranges and rivers of Burma. In Upper Burma, where the river valleys are narrow, the chief source of wealth lies in the extensive forests of teak, and in the world-famed ruby mines. Rice is easily the most important product of Lower Burma, and it is from this part of India that most rice is exported. *Rangoon*, on the Irawadi delta, is the great port for rice and teak. *Mandalay*, the chief city of Upper Burma, is the centre of the interior lowlands. It is the old capital, and contains splendid pagodas and shrines, dedicated to the worship of Buddha.

THE PEOPLE OF INDIA.

India is essentially an agricultural country, and this has important influences upon the distribution of the population. In 1911, India had a population of 315 millions, that is, seven times as great as that of the United Kingdom in the same year, or nearly three times as great as that of all the British Empire without India. In the same year, the population of Ceylon was three

and a half millions. Despite this enormous number of people, there are only ten cities in India and one in Ceylon which have a population of more than 200,000. The vast majority of the people live in villages, and the bulk of them are found in just those places we should have expected, *i.e.* in the valley of the Ganges, the Punjab, and on the east coast plain. The less productive parts, such as large areas of the Deccan and the Thar desert, support comparatively few people.

The descendants of the earliest inhabitants of India are found in the least accessible parts of the Deccan, in the swampy Ganges-Brahmaputra delta, and in Ceylon. They are darker skinned and smaller in stature than the people of northern India, whilst they speak languages which belong to quite a different group. They are called Dravidians, and it is thought that at one time they occupied the whole of India, but were pushed southwards and eastwards by more virile invaders, who probably entered India about 2000 B.C., by the great north-west gateways. (See Fig. 81.) These intruders were a taller, fairer race, quite different in appearance from the Dravidians, and akin to the people of Mediterranean Europe. They are known as the Indo-Aryans, and are best seen to-day in the Sikhs of the Punjab. The descendants of these early invaders are found in the north-west, nearest to the gateways by which they entered. In the upper basin of the Ganges, the prevailing type seems to be a mixed Indo-Aryan and Dravidian race, whilst in the lowlands, near the mouths of the Ganges and Brahmaputra, we find peoples of Dravidian blood.

During the first five or six centuries of the Christian era, continual inroads by steppe dwellers—Huns, Tartars and Scythians—occurred. Their plunderings were confined mainly to the north-west, for they met with opposition in the Ganges valley, but they appear to have settled in considerable numbers on the black earth lands of the Deccan, where they found a fertile land, for here to-day the predominant types appear to be of mixed Mongol and Dravidian descent. Later still,

conquests by the Mohammedans took place. They, too, entered by the north-west gateways, and became very powerful, and established great empires, but their influence upon race was very slight, nor, except in the Punjab, had they much influence upon religion.

The approaches to India from the north-east are not so easy as those from the north-west. Some invaders have come, however, though in relatively small numbers, along the passes where the Brahmaputra enters India. These people were yellow-skinned, black-haired Mongols, whose descendants are still found in eastern India and in Burma, where the people are essentially Mongolian, and quite different from the inhabitants of India.

The Himalayas form a great barrier, effectively preventing race migration into India from the north, except in small numbers. It is interesting, however, to notice that the people of Nepal and the Gurkhas appear to have crossed the Himalayas from Tibet. They are small, hardy people, and very fond of fighting.

All these invaders entered India by the land routes, but we must not forget that India to-day is held by a nation whose approach was from the sea. In the seventeenth century, England, Portugal and France had coast trading settlements, but it does not appear as though they thought of conquest at that time. Later, conquests began by the English from Madras, and by the French from Pondicherri. These places are on the east coast, where communication along the coastal lowlands and westward expansion to the Deccan are comparatively easy. Struggles between the English and the French resulted in the victory going to the former. Living on the Deccan, east of Bombay, were the warlike Mahrattas, who extended their power northwards, and a struggle between them and the British for the possession of the Ganges plain was decided by the battle of Plassey (1757), in which the British were successful. Early in the nineteenth century, Delhi was captured, and this led to British power being established in the Indus valley, and to its final extension to practically the whole of the peninsula.

The Portuguese and the French still have trading stations, the most important being the west coast settlement of Goa (Portuguese), and the east coast settlement of Pondicherry (French).

Of the religions of India, little need be said here. Two-thirds of the people profess Hinduism, a most complicated religion, whose distinguishing feature is the caste system, which keeps millions of the people in a state of pitiful subjection. Rather more than one-fifth of the people are Mohammedans, who are found in all parts of the country, but in greatest numbers in the Indus basin, west of the Thar desert. They are the descendants of the Mohammedans who entered India by the great gateways of the north-west, between the sixth and the sixteenth centuries. In order of numbers the Buddhists come next, and they are found almost entirely in Burma, where the population is chiefly of Mongol extraction, and in Ceylon. Buddha taught that Nirvana, the final end of life, is to be reached by a life of self-denial and indifference to pleasure and pain. Such a belief has the effect of making its followers live quiet and peaceful lives, but is not helpful to national advancement.

We have seen that India is a large country, with a large population composed of many different races, who belong to many different creeds. At present the land is governed by a nation, the British, who are non-Indian in race and religion, and who do not make it a permanent home. They have established law and justice, and have brought a considerable amount of prosperity, and there can be no doubt whatever that their rule has been of enormous value to India itself. As to the natives, although education is rapidly making headway, and many Hindus have been advanced to administrative posts, the great bulk of the people are quite unable to rule themselves. The future holds many interesting questions for settlement, and among them, not the least important is, "Will India, like Australia and Canada, remain within the British Empire as a great self-governing empire, or will she seek out her own salvation as an independent state?"

INDO-CHINA.

INDO-CHINA AND THE EAST INDIES.

Physical Features.—A physical map shows that the mountain chains which traverse the peninsula from north to south are continuations of those of Eastern Tibet. The rivers Mekong, Menam, Salwin and Irawadi flow along little-known gorges in their upper courses where the ranges come close together, but their lower courses occupy broad valleys over which they have spread extensive deposits of alluvium in times of flood. They have also built great deltas.

Climate and Products.—On the whole the climate resembles that of India, *i.e.* it belongs to the tropical monsoon type. Annam, however, also receives winter rains from the north-east winds. All the highlands are heavily forested, and teak forms an important export, especially from Siam. Rice, grown on the lowlands where water can easily be obtained for flooding the fields, is the most important crop, and forms the chief article of food. So much is grown that there is a large surplus for export. Coffee is grown on the hills of Annam, sugar in Annam and Cambodia, and in the hotter, wetter south, whilst rubber trees have been successfully planted in Cochin-China, which is also noted for pepper.

Political Divisions.—The physical structure of Indo-China greatly influenced the formation of many independent native states, gathered round the river lowlands, between which there was little communication on account of the mountain barriers which separate them from each other. Tong-king occupies the delta of the Song-ka or Red River, Cambodia and Cochin-China are in the lowlands of the Mekong, Siam is largely the valley and delta of the Menam, Burma is the land of the Irawadi, whilst Annam is the narrow coastal plain between the eastern ridges and the South China Sea. France rules in the east, Britain holds sway in the west, whilst between the possessions of these powers there is the independent buffer kingdom of Siam. In the upper courses of the

great rivers are the Shan States, which, although owing nominal allegiance to England, China and Siam, are practically independent owing to difficulty of access.

The capital of Tong-king, and since 1902 the capital of French Indo-China, is *Hanoi*, situated on the Red River about sixty miles from the sea. It is really a collection of many native villages, and formerly was on the sea-coast. A railway has been constructed from Hanoi to Yunnan in south-western China, and has been the means of increasing the trade of Hanoi. *Huế*, the capital of Annam, is a very poor port, for it is situated on a coast which is dangerous for ships, owing to strong winds and storms. *Saigon* is the capital of Cochin-China. It has a good harbour and is connected to the Mekong by rail and canal. There is no very important town in Cambodia, but this country was once very powerful. The old kingdom gathered round the large Lake Tonlé Sap, which regulates the supply of water to the Mekong, and its former importance is indicated by the extensive ruins to be seen there.

Bangkok, built nearly forty miles up the Menam, is the capital of Siam. Unfortunately the presence of a bar at the mouth of the river makes it impossible for large vessels to reach the city, which stands on the river, from which branch innumerable creeks or klongs. Bangkok has been called "the Venice of the East." The comparison fails in all points, except perhaps in the amount of traffic by water.

The people of Siam very much resemble the Chinese. It is probable that their ancestors came from China, and by gradual stages followed the Menam, eventually reaching its mouth, where they built Bangkok, their final capital.

THE EAST INDIES.

Physical Features.—The East Indies lie between Asia and Australia, Wallace's line separating those islands which are Australian in flora and fauna from those which are Asiatic (Fig. 89).

The archipelago is bounded on the west by the volcanic chains which traverse Sumatra, Java and the smaller Sunda Islands. These are continued through the Moluccas, or Spice Islands, and join the eastern volcanic chain (see p. 286) which passes through the Philippines. A continuation of the Malay Peninsula may be seen in the small islands of Banka and Billiton.

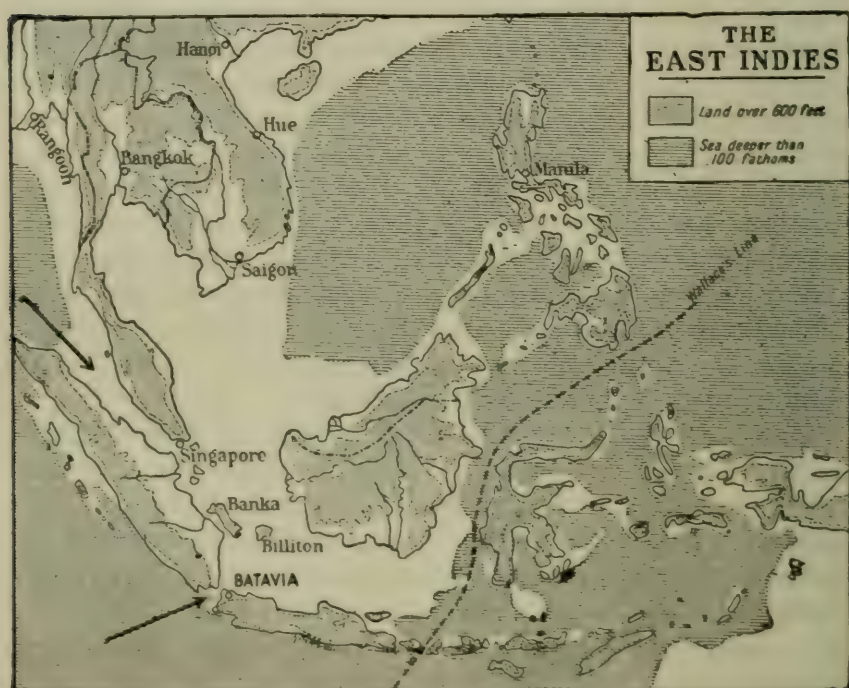


FIG. 89.—The East Indies.

east of Sumatra. Between this volcanic girdle and the mainland of Asia, Borneo stands on a continental shelf, and is separated from Celebes by a deep strait.

Climate and Vegetation.—No part of this region is outside the tropics, so that, except at high altitudes, a uniformly high temperature is experienced, and rain falls at all seasons. The equinoxes are the periods of heaviest rainfall in the parts of the region nearest to the equator; but islands towards the northern or southern

margins have most of their rain in their respective summers.

The natural vegetation is of the equatorial type, and is especially luxuriant in the volcanic islands. The lowlands are often dense jungles, infested by snakes and wild animals.

The Inhabitants of the East Indies.—Since the lowlands open to the sea, and the straits between the islands are not very wide, and are not as a rule visited by severe storms, the natives of the East Indies have readily taken to the sea, and there has been a great intermixture of races. On the other hand the lowlands, especially in Borneo, are separated from each other by mountain ridges, and there is often a lack of intercourse between the natives of the same island. One result of this has been the formation of several independent native states in the same island, the best example being seen in Borneo. On the whole the natives are very backward, and many of those who live in the little-known interior regions and hill country are cannibals even to this day. The Malays, who resemble the Chinese in their oblique eyes, round heads and wide cheeks, are more numerous than peoples of other races. There are also wavy-haired peoples of the same race as the Dravidians of India, as well as many very dark-skinned, woolly, or peppercorn-haired peoples of negro origin. Both of the latter types are small in stature, and are often so short as to be called pygmies. That descendants of diverse races should be found in these islands is probably due to the fact that the islands are on a "bridge" between continents, and the various races who have passed this connecting link have done something, however slight, to influence race.

The Portuguese were the first Europeans to reach the East Indies, and they did so in the 15th century. They were closely followed by the Spaniards, who reached them by sailing westwards from Spain. The Philippines formed part of the Spanish possessions until 1898, when they were ceded to the United States. In the 16th century the Dutch established many trading settlements,

and to-day their possessions are more extensive than those of any other power.

DUTCH POSSESSIONS.—Although not the largest, Java, the “Garden of the East,” is the most important, for by means of garden cultivation, the Dutch have made it the most productive and most densely peopled island in the archipelago. The total population of the Dutch East Indies is nearly forty millions, and of these thirty millions are in Java. This development has been helped by the great fertility of the volcanic soil and the abundant rainfall, as well as by the construction of railways and good roads. The range of products is very wide, but those for export are chiefly rubber, coffee, sugar, cinchona and tobacco, whilst the staple articles of food are rice and sago. The capital of Java is *Batavia*, which controls the Sunda Strait between Sumatra and Java. The remainder of the Dutch East Indies have been less developed. Sumatra and Dutch Borneo export pepper, coffee and tobacco; Celebes and the Moluccas are noted for spices. The Moluccas are the famous Spice Islands.

THE BRITISH POSSESSIONS.—These are in the Malay Peninsula and Borneo. In the Malay Peninsula are the *Straits Settlements* and the *Federated Malay States*.

The former is a Crown Colony comprising Singapore, Penang (including Wellesley Province and the Dindings) and Malacca. The most valuable is *Singapore*, which owes its importance to its commanding position (see Fig. 89). It is an island about twenty-seven miles long by fourteen wide, and is separated from the Malay Peninsula by a strait about three-quarters of a mile in width. The port of Singapore has developed an enormous *entrepôt* trade, and produce from all parts of the world may be found in its warehouses. Besides being a great trading centre, Singapore is a strongly fortified coaling-station, and possesses extensive dock-yards. *Penang* is an island in the Straits of Malacca; *Wellesley Province*, the strip of mainland opposite; *the Dindings* comprises a small island and a strip of mainland, and *Malacca* another coastal strip. Most of the trade of these settlements is done at Singapore,

the chief articles exported being tin, sugar, pepper, nutmegs and other spices, sago, gutta-percha and rubber. Of these, tin is easily of greatest value. It is worth noting that more than one half of the tin mined in the world comes from the Malay Peninsula. *Labuan* lies six miles from the north-west coast of Borneo, and is important on account of its coal mines, which supply the British warships on the China station as well as trading ships.

The Federated Malay States.—These are a number of native states (of which Perak and Selangor are the chief), occupying the eastern portion of the southern Malay Peninsula. They are under British protection, the native rulers being advised or controlled by British representatives. A large proportion of the inhabitants are Chinese who have emigrated to the peninsula in order to work in the tin and gold mines, and to supply labour in the fields, where rice, rubber, sugar, tapioca and pepper are cultivated.

British Borneo.—The British possessions in Borneo are *British North Borneo*, a territory under the jurisdiction of the British North Borneo Company, *Brunei*, a native state under British protection, and *Sarawak*. The chief cultivations are very similar to those of the Malay Peninsula mentioned above. In addition, British North Borneo exports large quantities of tobacco, and Sarawak has rich deposits of coal as well as gold, silver and quicksilver.

The Philippine Islands.—We have already learned that the Philippines, so named after Philip II of Spain, form part of the great volcanic girdle of the Pacific. Destructive earthquakes are frequently experienced, as well as terrific cyclonic storms called *typhoons*. These are accompanied by very heavy downpours of rain and by winds so strong that trees are uprooted and cities destroyed. The chief articles exported are tobacco, which is made into cigars (the only manufacture of importance), a fibre (Manila hemp) obtained from a wild plantain very closely resembling the banana, and some coffee, sugar and cacao. The capital and chief town is *Manila*, which has the great advantage of being the

point at which routes from Hongkong, Singapore, Australia and the west of the Americas meet.

THE CHINESE LANDS.

I.—CHINA PROPER.

The Chinese Lands cover a very large area, as they include Mongolia, Manchuria, Eastern Turkestan and Tibet, as well as China Proper. Ninety-five per cent. of the people are in China Proper, which includes less than half the area.

PHYSICAL FEATURES AND CLIMATE.—China is a country of high mountains opening to lowlands along the Pacific coast. It is a very compact area, almost shut off from the rest of Asia by natural barriers, yet easy of entry by land from the plains of Manchuria in the north, but most of all by the sea and the great rivers. South of the Yangtse, China has a less extent of lowland than north of that river, but the land is not generally too high for settlement although it naturally supports a smaller number of people, except in the plains bordering the rivers. Of the Chinese rivers, a glance at the map is sufficient to show that there are three of outstanding importance, the Hwang-ho or Yellow River in the north, the Yangtse-kiang or Blue River in the centre, and the Si-kiang or West River in the south. (See Fig. 90.)

Turning to the climate, we are already familiar with the fact that China has a monsoon type of climate, but important differences must be noted.

Place	Lat. N.	Temperatures.		Rainfall in inches.				
		Coldest month	Warmest month.	March- May.	June- Aug.	Sept.- Nov.	Dec.- Feb.	Total.
Peking	40°	23° F.	79° F.	2·4	18·2	3·5	0·4	24·5
Hankow	30	38	83	17·6	19·9	8·9	4·3	50·7
Canton	23	55	83	17·6	29·2	14·8	3·9	65·5

These figures show (1) that in all three cities most rain falls in summer, although in Peking the early summer is drier than farther south, (2) that Southern China has a heavier rainfall than Northern China, (3) that for their latitudes all three towns have low winter temperatures. The latter fact is accounted for by the cold winds which blow at that season.

Taking the three towns as typical of Northern, Central and Southern China, we may see from the figures that Northern China has cold winters and hot summers, Central China cool winters and hot summers, and Southern China warm winters and hot summers. China falls so naturally into these three regions that we shall consider each in turn. North and Central China may, however, be grouped together as a type of the temperate monsoon climate. South China, like India, belongs to the tropical monsoon type.

NORTHERN CHINA.

Northern China is mountainous in the west and low in the east. Part of its southern boundary is clearly marked by the Tsingling-shan, which forms a mountainous boundary between the Wei-ho and the Yangtse-kiang. The boundary on the plains cannot be so clearly defined. A large part of Northern China is covered by a deposit called *loess* (see Fig. 90). The outflowing winter winds carry with them very fine dust from the arid plateau regions over which they have passed. This dust has accumulated on the margin of the plateau, and in the course of time has completely buried not only the plain, but the mountains and hills with a mantle of loess often 1,000 ft. thick. The great disadvantage of loess is its porous nature, for it is so easily cut through that rivers and roads often cross it by intricate passages, on each side of which are very steep, often quite vertical walls. It has, however, the great advantage of being fertile, although in this connection its porous nature is a drawback, and makes irrigation

a necessity in most parts. In colour it is yellow, or brownish-yellow, hence the names of the Yellow River and the Yellow Sea.

The chief rivers of Northern China are the Hwang-ho and Pei-ho, or North River. The *Hwang-ho* rises in



FIG. 90.—Physical map of China.

Tibet, and its upper courses are fed by melting glaciers, which, together with the heavy summer rains of the mountainous region across which the upper stream and its tributaries flow, causes disastrous floods when the swollen river leaves its narrower mountain

bed for the plains of its lower valley. In this part of its course it does not follow a permanent channel, as, owing to the deposition of sediment along the bed, the latter is constantly being raised, so that the river really runs on a self-created ridge that is increasing every year in height. This, of course, necessitates the construction of dykes or embankments in order to confine the river to its channel, so that there is the ever present danger that it may burst the dykes and find a new course. This has happened several times in the past with terrible results, for when the last serious change took place in 1851, owing to the dykes near Kaifeng giving way, the river, which is here very wide and swift flowing, turned northwards and found a new mouth north of the Shan-tung peninsula. Kaifeng is now about twenty miles south of the river, and twenty feet below its level. In 1887, and again in 1898, the bursting of the dykes caused widespread devastation, the toll of those who lost their lives being measured in millions. It is no wonder that the Hwang-ho is called "China's Sorrow." As it flows fast, is not very deep and is liable to floods, it is not of very great commercial value, and in its lower course there are no large towns on its banks. The important Wei-ho tributary of the Hwang-ho must be noticed. It is important not only because it was probably in its valley that the Chinese civilization had its birth, but also on account of the routes which continue the line of the lower Hwang-ho, and pass through Langchow, where they reach the Hwang-ho once more, and then strike across the central plateaus to the Zungarian Gate, and beyond to the towns of Siberia.

In the mountainous west of Northern China, agriculture is not so easily carried on as in the lowlands, and is in most cases dependent upon irrigation, which is often impossible in a loess-covered region. The plains, however, support a dense population engaged in the growing of wheat, barley, beans, millet, maize, and, to a smaller extent, tobacco and cotton. Cultivation is carried on with the careful attention which we

give to our gardens. The Shan-tung peninsula, an isolated highland region, has areas of oak forests, and these are important owing to the use of the leaves for the feeding of silkworms. The naval and military importance of the peninsula is shown in the occupation of Wei-hai-wei by the British, and the former occupation of Kiau-chau by the Germans. The latter has been ceded to Japan.

The most famous town in Northern China is *Peking*, the capital of China. China is easily entered by land routes from the plains of Manchuria, and it was the great importance of this gateway that led to the selection of Peking as capital, although the city itself was finally captured in the seventeenth century by Manchu invaders, who also made it their capital. The danger of invasion from the north is also seen in the position of the Great Wall of China. Peking not only commands the route to Manchuria, now followed by a railway which connects it with the Trans-Siberian line, but also the route to Mongolia, via the Pei-ho valley and Kalgan.

Tientsin, the port of Peking, has a larger population than the capital, but unfortunately it cannot be reached by large steamers, whilst the river freezes in winter for about three months. It is the northern terminus of the Grand or Imperial Canal, which gave a water connection between Tientsin and Hangchow, but of late years it has been so neglected that many parts, especially in the north, have fallen out of repair. A North China town of great historical interest is *Si-ngan* on the Wei-ho. For two thousand two hundred and fifty years this city was the capital of China.

Before leaving Northern China, reference must be made to the great wealth of coal and iron this part of the country possesses. The Shansi highlands are especially rich in both, and mining also takes place in Shan-tung and other parts. The railway from Peking to Hankow passes along the eastern margins of the Shansi region, and will do much to develop iron and other manufacturing industries. The plains of North

China are practically treeless, and coal will supply a needed cheap fuel, as well as lead to a development of manufacturing.

CENTRAL CHINA.

This comprises the basin of the Yangtse-kiang. The higher temperature at all seasons, and the heavier rainfall make life easier than in Northern China, and have an important influence upon vegetation and the nature of the chief cultivated products, which are those of a distinctly warmer type of climate. Rice, tea, sugar, cotton, as well as the cereals of the north, are all important cultivations. As in Northern China, agriculture is by far the most important occupation. Notice on a physical map the basin of Sechwan situated in the upper valley of the Yangtse-kiang. It is an elevated region, but is not so high as the surrounding land. Sometimes it is called the Red Basin, on account of its fertile red soil, which has come from the red sandstone of which the area is largely composed. Most of the vegetable products mentioned above are grown easily, although irrigation is usually necessary, especially for rice. The chief town is *Chengtu*, the centre of a densely peopled area of extraordinary fertility, famous for its garden cultivation. The hillsides have been carefully terraced, so that cultivation is carried on at a height of many thousand feet above sea-level. Although Sechwan is noted for its agriculture, it has also very extensive coal and iron deposits, whilst the more precious metals and copper are known to exist in considerable quantities along the margin of the Tibet plateau. Sechwan is somewhat difficult of access owing to its build. The easiest entry is by way of the Yangtse, and it is on its banks that the port is situated. This is *Chungking*, which suffers from the disadvantage that the great gorges and rapids of the Yangtse, which interrupt the navigation of the river for some four hundred miles, are between it and Ichang. Below the latter city the river is navigable

for river boats and small ocean vessels to Hankow, and from there to the mouth for larger ocean vessels.

Between Ichang and Hankow is the lake-studded lowland region, known as the *Plain of the Middle*

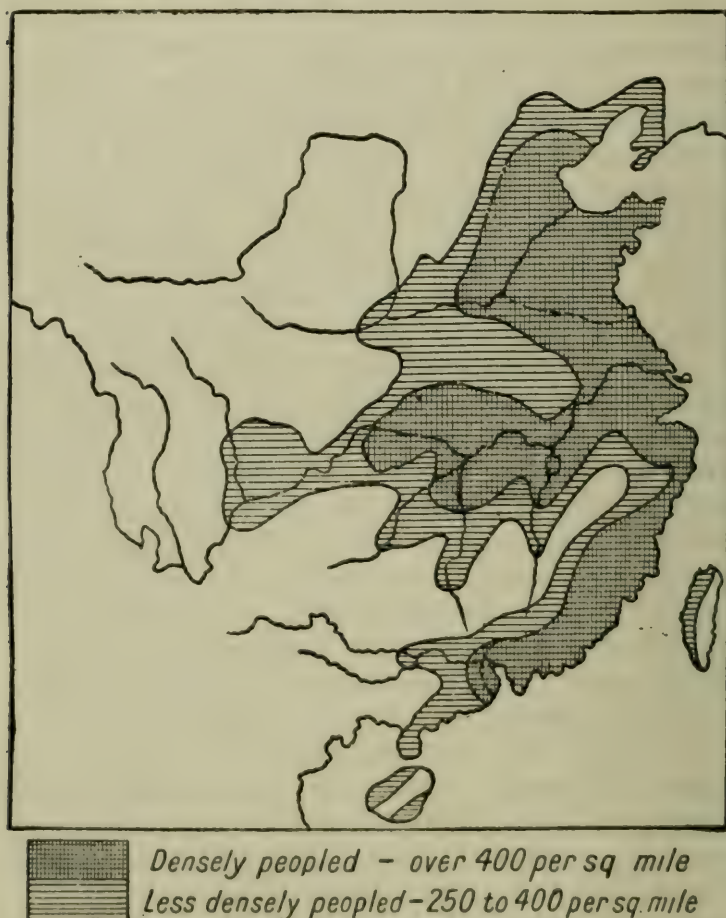


FIG. 91.—Map showing the most densely peopled parts of China.

Yangtse. The most important tributary in this section is the Han, whose valley gives an easy route to the north-west. At its confluence with the main river stands the triple city of Hankow-Wuchang-Hanyang, some six hundred miles from the mouth. Of these, *Hankow*, the second largest city in China, is of greatest

importance. It is a centre for rice and tea, whilst in recent years extensive ironworks have been built at Hanyang, across the Han from Hankow. There are also other ironworks in the neighbourhood, and considerable quantities of pig-iron are now exported to Japan, and even to the United States. Note the position of Hankow, between the points at which the rivers draining the large lakes of Tungting and Poyang enter the Yangtse. Since the Yangtse is fed mainly by melting snow and summer rains, like other great Chinese rivers it is much higher in summer than in winter. In summer these lakes act as great reservoirs, and thus help to check disastrous floods, whilst in the dry season, when the river is low, they help to increase the volume. (*Cf.* Tonlé Sap Lake and the Mekong.)

In its lower course, the Yangtse flows through a densely peopled region in which cotton, silk, rice and tea are of special importance (see Fig. 91). The outlet for this rich region—the richest in China—is the port of *Shanghai*, situated south of the Yangtse delta. Unfortunately, the harbour is in constant danger of silting up, owing to the great quantities of sediment brought down by the river, and dredging operations have to be resorted to continuously. Two other large towns in the lower Yangtse valley are *Nanking* and *Hangchow*. Each has been the capital of China in times past. Hangchow, at the southern terminus of the imperial canal, is the Kinsay so wonderfully described by Marco Polo, the great Venetian thirteenth-century traveller.

SOUTHERN CHINA.

Most of the country is mountainous, the east and west direction of the chief ranges being an obstacle to communication between the valleys of the Yangtse and the Si, so that the valleys of the rivers passing through Tungting and Poyang Lakes, are of great importance as routes. The highlands are generally forested, on account of the fact that the rainfall, though mainly occurring in summer, is sufficient for the growth of

forests. Considerable areas have been cut down, and agricultural pursuits are now followed in the clearings, but there are still extensive forests which supply valuable products, such as bamboo, camphor, and cinnamon. In the lowlands of the Si-kiang and in the coastal provinces, the chief cultivated products are rice, tea, sugar, oil-seeds, and indigo, products which remind us of those of India.

The high plateau province of Yunnan, in the west, is the least known and most backward part of South China, but it is known to be very rich in minerals. A large part of Yunnan is used for the pasturing of cattle and sheep, an occupation of no very great importance elsewhere in China, a country in which the products of pastoral pursuits (milk, cheese, butter, wool, etc.) are somewhat scarce. We have already noted the outlet of Yunnan, via the French port of Hanoi (see Fig. 90).

The largest city in all China is *Canton*, the port for the rich Si-kiang valley. It stands at the head of the extensive and wonderfully fertile delta made by three rivers, all of which are navigable and of importance, not only because they flow through fertile lowlands, but also because of the routes which follow their valleys. As in many other Chinese cities, a large number of people—over three hundred thousand—live in boats, which cover the river for many miles. Near the mouth of the Canton River, the estuary formed by the three rivers above mentioned, is *Hong Kong*, an island which has been British since 1841. Besides the island, the adjacent mainland, the peninsula of Kowloon, is also under British control. The chief town, Victoria (*Hong Kong*), has a splendid harbour, and is the headquarters of the British China squadron, as well as a great commercial port. Like Singapore and Shanghai, it has a large *entrepôt* trade, and goods from Europe, India, China, Japan, and Australia may be found in its warehouses. Other ports in Southern China are *Macao*, a Portuguese station, at the mouth of the Si-kiang, and *Amoy* and *Foochow*, both of which are situated in a province from which there is considerable emigration,

owing to the population being more than can be supported, even by intensive methods of cultivation.

II.—THE OUTLYING PROVINCES OF CHINA.

MANCHURIA.

A physical map shows that western Manchuria consists chiefly of lowlands, whilst in the east are highlands. Its climate is marked by exceedingly cold winters and hot summers, with rain in summer, the fall on the western plains being less than on the eastern highlands. It is because of this that the west is a steppe land, whilst the eastern mountains have extensive forests of coniferous and broad-leaved trees.

Owing to the development of railway facilities and the immigration of Chinese from Northern China, Manchuria has seen a greater development in recent years than any other part of the empire. The Chinese immigrants are engaged in agriculture—millet, beans, wheat and rice being the principal crops. The best agricultural lands are in the valleys of the Sungari, a tributary of the Amur, and the Liao, which flows to the Gulf of Pechili. Manchuria is rich in minerals, especially in the eastern mountains, but little mining takes place at present.

In the south there is the Liaotung peninsula, whose southern extremity is now leased to Japan. The leased land includes the important port of *Port Arthur*, a terminus of the Trans-Siberian Railway and an important commercial and naval base.

Two important Manchurian towns are *Mukden* and *Harbin*. Both are railway centres of considerable importance (see Fig. 78).

MONGOLIA.

This enormous country is an arid plateau, in the heart of which is the desert of Gobi, or Shamo, as the Chinese

call it. The north and east, the highest parts of the plateau, are crossed by high-mountains. The marginal lands are steppe lands whose rainfall is sufficient for the rearing of cattle, horses, and camels, the latter being the chief beasts of burden. It was from the north Mongolian steppes that Jenghiz Khan and his followers and suc-

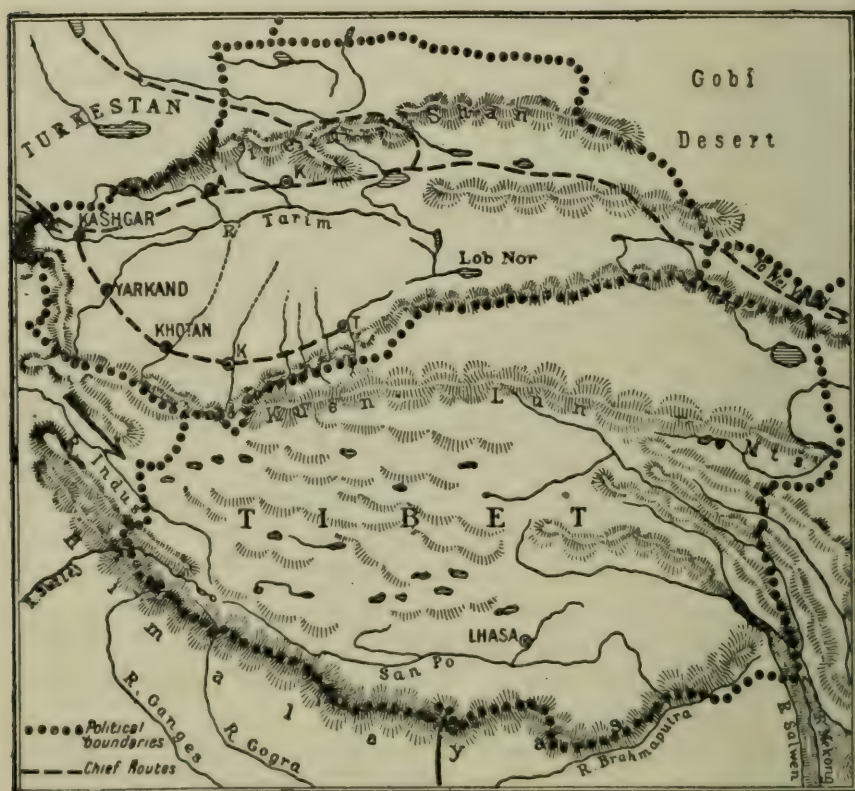


FIG. 92.—The Chinese provinces of Sin-kiang and Tibet.

cessors spread eastwards to China and westwards via the Zungarian Gate, between the Tien Shan and the Altai Mountains, across Siberia and Russia even to the heart of Europe. Their conquests were in no small measure helped by the hardy horses they possessed.

The chief trade route of the country has already been referred to. From Peking it follows the Pei-ho to Kalgan, and from there it crosses the Gobi desert to

Urga, the most important town in Mongolia. Leaving *Urga*, the route proceeds northwards to the Siberian towns of *Kiakhta*, on the frontier, and *Irkutsk*.

Chinese emigrants have spread into Inner Mongolia, and even to the margins of the Gobi desert, where, by means of careful irrigation, they have made agricultural pursuits possible. The natives of Mongolia are nomadic Mongols and Kalmucks, who are little given to agriculture, even in the more fertile parts, and are employed mainly in looking after their animals.

EASTERN TURKESTAN.

Eastern Turkestan, which is divided by the Tien Shan into two parts, a large southern area drained by the Tarim, and the smaller northern region of Zungaria, has a very extreme climate, and is very deficient in rainfall, so that it is a land of dry steppes and deserts.

The Tarim basin¹ is a plateau depression bounded by the Tien Shan mountains on the north and the Kwen Lun on the south. The Tarim and its tributaries are supplied with water from the encircling mountains, for there the rainfall is heavier, and the higher valleys contain great glaciers, whose melting provides water. When the rivers reach the foot of the mountains, their waters can be used for irrigation, and tracts which would otherwise be desert are green oases. As Fig. 92 shows, there are many rivers which never reach the Tarim, but lose themselves in the sand. Even the Tarim finally loses itself amidst the reedy swamps of Lob Nor. Although a centre of inland drainage, Lob Nor is not very salt, probably due to the fact that it is of recent origin. Since water can be obtained at the foot of the mountains, the trade routes pass either along a line of oasis towns south of the Tien Shan, or along a similar line north of the Kwen Lun, for except along the water-courses the Tarim basin is a desert. These trade routes meet at *Kashgar*, which

¹ This is a convenient title, but it should be noticed that the Tarim does not drain the whole area.

is also reached by caravans which have crossed the mountain passes on their way from Russian Turkestan. *Yarkand* and *Khotan* are on the southern route. All three are walled oasis cities intersected by irrigation canals, and consisting of low flat-topped houses surrounded by gardens and fields producing cereals and cotton. North of the Tien Shan, and between those mountains and the Altai Mountains is the steppe land of Zungaria, across which the great route from Siberia to Northern China passes.

As in Manchuria and Mongolia, there has of recent years been a very considerable Chinese immigration into Eastern Turkestan.

TIBET.

Tibet is a high bleak plateau, a *Region of Lasting Difficulty*, so cut off from surrounding lands by high mountains as to be difficult of access, and therefore it is often known as "Mysterious Tibet." From Darjeeling difficult routes lead over the Himalayas, others enter on the west by means of Karakoram passes. From China the best routes either follow the Wei-ho, or cross the ranges separating south-eastern Tibet from Sechwan (see Fig. 92). The chief Tibetan import, tea, is brought along the latter routes.

Not only do these mountain barriers make it very difficult to enter Tibet, but they also shut out rain-bearing winds, whilst the great elevation of the plateau—over three miles—has such an influence on the temperature, that despite its nearness to the tropics, the country is swept by icy winds, and snowstorms are common. Permanent settlement is not possible over the greater part of northern Tibet, the scattered inhabitants obtaining a livelihood by pasturing yaks, goats and sheep, and in some parts camels. The great majority of the people live in the southern valleys, especially in that of the San-po, the Tibetan name for the upper Brahmaputra. Here it is possible, owing to the presence of alluvial soil, to grow fruits

such as apricots and peaches, as well as wheat, barley, and peas; but, in order to do this, it is necessary to resort to irrigation.

The capital is *Lhasa*, the Forbidden City. It is situated in the valley of a tributary of the San-po, and is famous for its imposing monasteries. The prevailing religion is Lamaism, a degraded form of Buddhism, and in most parts of the country little better than devil-worship. Every dark spot—a cave, a hole in a wall, a crack in a rock—is filled with evil spirits who must be kept off by means of strings of flags, prayer poles, and many other devices.

THE CHINESE AND THEIR HISTORY.

There are few English people who are not familiar with the physical appearance of the Chinese, who are members of the great Mongolian race. Travellers who know China and its people intimately, always speak of the Chinaman's unvarying cheerfulness, even under depressing conditions. As a general rule he is thrifty, a splendid organizer, with phenomenal capacity for adapting himself to circumstances, exceedingly polite, and very trustworthy. He is particularly open to reason, and is capable of putting forth very considerable staying power, even on occasion enduring hunger, thirst, or exposure to a greater degree than most races. The ignorant Chinaman is, however, very superstitious, and believes in all kinds of spirits, mostly evil, who are about him with the intention of doing harm to him unless they are appeased by gifts or driven away by noises.

When the immense size of China is taken into consideration, it is remarkable that there is such a similarity of type throughout the empire. Naturally, the Cantonese, noted for the ardour with which he pursues commerce, his alertness and his anxiety to have a finger in every pie, the real Chinaman of the north, famed for his simplicity and reserve, and the Manchu, differ very considerably, but their differences are small compared

with those found in India. There are many different languages in China, and yet Mandarin, the official language, is spoken and understood in most parts of the country. Indeed, the difficulties caused by differences in race and language will probably be overcome when better means of communication are introduced, and people from all parts are brought into intimate relations with each other. Isolation from other countries has produced in the Chinese not only an enormous conceit—their rulers are the Sons of Heaven, and they themselves the Celestials—but has made them very conservative and antagonistic to all reform, so that the foreigner, who has introduced new things into the country, is often regarded with hatred and distrust.

It is commonly stated that there are three religions in China—Buddhism, Confucianism, and Taoism—but this is misleading, since there are many Chinese who profess all three. The outstanding features of the beliefs held by the great mass of the people are ancestral worship, and the desire to attain the final end of life by living quiet, peaceful lives of self-denial and indifference to pleasure and pain. The effect of this has been to make the family the unit, to check initiative and adventure, and thus to give China a lack of the sense of nationality.

There are signs that the Chinese are awakening. Large numbers of their young men now take courses of study in European and American universities, and as a result of this, Western knowledge is spreading; the mineral resources are being worked, and large quantities of machinery are being imported. There are, however, many difficulties to overcome before China becomes one of the great powers of the world. Leaders will be needed, and since China has no natural ruling class, it seems as though these will have to be found among those who have been educated abroad. What a splendid opportunity other countries have of helping China to a proper feeling of national consciousness, and to find her way to greatness along the best lines! China in the past has been noted for its back-

ward look, its pronounced conservatism; to-day she has the forward look, and modernism is the new passion of millions of her people. Where rush-lights were used twenty years ago, we now find the electric light, junks are giving way to steamships, straggling footpaths to railways and motor roads.

We have learned that Chinese civilization grew up in the valley of the Wei. From here it was easy to spread to the great plains of the north, which for two or three thousand years remained the home of the Chinese people. About two centuries before the birth of Christ, the people appear to have begun the great movement of spreading over the southern part of China, a movement which took some four hundred years to complete. Hitherto the dense forest and jungle character of the land had prevented this. But the Chinese have not had the undisturbed possession of their vast country. There have been constant invasions from the less favoured steppes and the plateau deserts to the north and north-west, and these necessitated the building of the Great Wall more than two hundred years B.C. In the thirteenth century A.D., the great Mongol conquest, begun by Jenghiz Khan and completed by his son and grandson—the famous Kublai Khan—was accomplished. The last conquest of China was that by the Manchus, who entered from the north by the easy route from Manchuria, but both Mongols and Manchus were absorbed, owing to the size of the land and the numbers of its people. Some years ago it was the danger of Russian threats along the same route which led to the Russo-Japanese War. On February 12, 1912, China became a republic.

THE JAPANESE EMPIRE.

Japan is often called the "Britain of the East," although the similarities between our own islands and Japan are not so prominent as the points in which they differ. Both countries are composed of islands lying off

the opposite shores of the great Eurasian landmass, and in easy reach of mainland countries which have large populations. Each country has splendid harbours, and is endowed with considerable mineral wealth ; but the chief point to notice is that, owing to these similarities, each country is a great maritime power. When we examine their structure, their positions with regard to the equator, the climatic contrasts caused by the location of one on the west and the other on the east of a great landmass, and the influence of these factors upon vegetation and occupations, we see that there are wide differences between the two countries.

PHYSICAL FEATURES.

We have learned that the Japanese Islands are part of the great belt of volcanic mountains surrounding the Pacific Ocean. Evidence of volcanic activity is seen in the frequent earthquakes and the presence of hot springs, whilst there are several active volcanoes. The beautiful Fuji-san (12,500 ft.), the most famous of Japanese volcanoes, has not been active for about two hundred years.

Two distinct chains, separated by a rift valley, traverse northern Honshiu from north to south. In southern Honshiu a change of direction is evident, and we can distinguish two* ranges running from south-west to north-east, the northern one forming the long, narrow continuation of western Honshiu, the other, the islands of Shikoku and Kiushiu. Between them is the depression occupied by the Inland Sea. From Hokkaido, or Yezo, one range is continued by the Kurile Islands, and another by the mountains of Sakhalin.

So much of Japan is mountainous (see Fig. 93) that the height of the mountains and their nearness to the coast make the rivers so short and swift-flowing as to be of little value for commerce. They are also loaded with sediment, and consequently fill up harbours and bring about the decline of ports, *e. g.* Tokyo and Osaka.

The few lowlands are separated from each other by mountains, so that until the building of railways communication between them had to be by sea. The



FIG. 93.—Japan. Relief and chief railways.

largest extent of lowland is north of Tokyo, and it is here that the population is densest. The narrow coastal plains around the Inland Sea are also densely peopled.

East of Japan the Pacific Ocean rapidly descends to enormous depths. Quite close to the east coast is a basin more than 4,000 fathoms deep. On the west the Sea of Okhotsk and the Japan Sea are much shallower, although they, too, must be considered as deep in comparison with the shallower Yellow and East China Seas, or the continental shelf surrounding Britain.

CLIMATE AND CHIEF OCCUPATIONS.

Climate.—The climate of Japan is temperate monsoon in type, its distinctive features being due to its position off the shores of the great landmass of Asia. In winter it receives cold winds from the continent, and in summer the monsoon winds blowing from the ocean towards the low pressure areas in Central Asia. Thus it is that the country receives most of its rain in summer, although the west coast has rain and snow in winter also, this being due to the winds picking up some moisture in crossing the Sea of Japan. In amount the rainfall is generally heavy in all parts, but is less in the west than in the east.

As regards temperature, the great stretch in latitude is a very important factor. Speaking generally, Japan has an extreme climate despite its insular character, for the winters are much colder than would appear from the latitudes, whilst the summers are hot. We have seen that the warm Kuro Siwo, or Black Stream, sweeps past the eastern shores of Japan. In winter this current has little effect on the climate, because the winds at that season blow from Japan to the Pacific, *i. e.* off shore, whilst in summer there is not a very great difference between the land and sea temperature, so that the modification of the land temperatures by the cooler winds from the sea is not very marked. Off the shores of the latter island the meeting of air currents whose temperatures have been affected by the warm Kuro Siwo or the cold Kurile current from the Bering Strait, causes fogs such as are common on the banks of Newfoundland.

Vegetation.—Owing to the heavy rainfall the moun-

tains of Japan are forest clad. In the cooler north coniferous and broad-leaved trees are found, whilst the warmer southern regions produce bamboos, gigantic cedars, maples, mulberries, camphor and lacquer trees. The bamboo is of enormous value, for the uses to which the different parts of the tree can be put are almost innumerable. Lacquer, used in the decoration of many Japanese articles, is the gum exuded by a large shrub. The northern forests supply wood-pulp for paper-making and wood for the match-making industry. The pastoral areas are not very extensive, and the effect of this is seen in the comparative scarcity of cattle, horses and sheep, and hence of such products as leather, dairy produce and wool.

As regards the cultivated plants, rice, as in the other lands of monsoon south-eastern Asia, comes easily first. Wheat, barley and oats are grown in the cooler parts, and as winter crops in the rice fields after the rice has been harvested. Tea is also very important, and is grown largely on the terraced slopes of the central and southern highlands. Mulberries are extensively cultivated, and as the climate is very suitable for the silkworm ("the Honourable Mr. Baby"), Japan not only produces enough silk for her own needs, but has a large surplus for export. Other minor products are cotton (not nearly in sufficient quantities for the Japanese cotton trade), indigo, tobacco and sugar. The method of agriculture resembles that of China in that it is almost entirely done by laborious spade cultivation. Although this careful method increases the yield, the land available for cultivation is so limited that even rice, the chief article of food, has to be imported in large quantities to supply the needs of the people.

The *mineral wealth* is very valuable and varied, and since the Japanese began to copy Western nations the output has increased enormously. The characteristic minerals are sulphur, kaolin and copper. Sulphur, of course, is obtained from the volcanic regions, and, together with the timber from the forests, has led to match-making. The presence of kaolin accounts for

the fine porcelain for which the Japanese are justly noted. It is obtained chiefly in the Nagoya area of Honshiu. Copper mining is one of the chief of the mining industries, the district north of Tokyo being the greatest copper-producing area of Asia. The artistic bronze work, for which Japan is famous, is due to the



FIG. 94.—Japan and Korea. Economic map.

great supplies of copper. Silver, lead, petroleum, as well as coal and iron, are also important mineral products. The largest coal deposits are in Yezo, northern Honshiu and Kiushiu (see Fig. 94). It is unfortunate that coal and iron are not found together.

Fishing is one of the leading occupations in Japan. Fish forms a very important part of the food of the people, not only because from religious motives meat is avoided, but also on account of the presence of rich

fishing grounds within Japanese waters. Mention has already been made of the ocean currents which sweep past Japan, and it is largely because of the food for fish brought by those currents, and on account of their different temperatures, that fish are not only abundant, but also of great variety. Then, again, the indented nature of the coastline helps the industry. There are said to be nearly one million people in Japan who have fishing as their *sole* occupation. The chief fishing grounds are in the shallow waters bordering the coast of Yezo, but the occupation is widespread along most of the coasts. Herring, mackerel, sardines and tunny are the chief species caught. In addition to their value for food purposes, fish are commonly used as manure in order to enrich the agricultural lands.

The fishing ability of the people has made Japan one of the world's great naval powers, but even before the days of modern navies they were able to defeat with ease those who tried to invade their land.

CENTRES OF POPULATION AND COMMUNICATION.

The most thickly peopled parts of Japan are the fertile lowlands bordering the coasts, especially those along the margins of the inland sea and north of Tokyo, and it is in these places that the largest cities are to be found.

Tokyo, the capital, is the largest city, its population exceeding two millions. It stands, within sight of Fuji-San, at the head of Tokyo Bay, on the banks of a river which has silted up its harbour, so that it is no longer a port. Many industries are followed in the city, the chief being the modern manufacture of clothing, matches and chemicals, as well as the ancient industries in ivory, bronze and lacquer-ware. The port for Tokyo is *Yokohama*, on the western shores of Tokyo Bay. It is the great port for trade with the mainland of Asia, Australia, western America and Europe. It carries on the foreign trade of the largest and most densely peopled lowland in Japan.

Osaka, the second largest city, also owes its position to the lowlands in its hinterland. It stands at the mouth of the river which drains Lake Biwa to the Inland Sea, and is declining owing to the silting up of its harbour. It is the chief seat of Japanese cotton-spinning. As a general rule, Indian cotton is used in Japan, and since fine yarns cannot be spun from this cotton, the bulk of the home-made trade is in coarse counts. There is now, however, a growing import of American cotton, and this means that the Japanese cotton trade will more and more compete with that of other countries, especially with that of Lancashire. *Osaka* is also engaged in shipbuilding. *Kobe*, a neighbouring port, has risen to prominence owing to the decline of *Osaka*, and is a great rival of *Yokohama*. Its chief industries are similar to those of *Osaka*. *Kyoto*, the third largest city, is situated amidst beautiful surroundings, near to Lake Biwa. Until 1868 it was the capital, and has declined in importance since the removal of the seat of government to *Tokyo*. It is in the centre of the best silk and tea producing districts, and is also noted for its artistic productions.

Nagasaki, on the west coast of *Kiushiu*, has a magnificent, deep, land-locked harbour, backed by a fertile and productive hinterland, whilst supplies of excellent coal are close at hand. It has thus developed great naval and shipbuilding dockyards. The chief town and port of *Yezo*, the northern island, is *Hakodate*, which has also a splendid harbour, and large supplies of coal near by. Its chief trade is in coal and fish.

The Japanese Empire also includes *Korea*, *Formosa*, and the leased territory containing the great port of *Port Arthur*, the southern terminus of the *Trans-Siberian Railway*. In addition, Japan rules under mandates from the *League of Nations* many of the *Pacific islands* formerly belonging to *Germany* (see p. 554). The German rights over the leased *Kiauchau* territory (*Shan-tung peninsula*) are also ceded to Japan.

KOREA.

Korea, or Chosen, is a mountainous peninsula, whose eastern coast rises steeply from a very narrow coastal plain, bordering the Sea of Japan. As we proceed towards the west coast, the elevation becomes less and less, until the coastal plains bordering the Yellow Sea are reached. On account of the configuration, the majority of the inhabitants are found in the west, where the lowlands are suitable for cultivation, especially of rice, which, as in the other monsoon lands, forms the chief food of the people. Other products are millet, beans, cotton and hemp. Gold is mined in the north in considerable quantities, and the country is also rich in coal and iron, but their development is very backward. Pastoral occupations are of much greater importance in Korea than in Japan, and hides form one of the chief exports.

The capital is *Seoul*, situated some sixty miles from the mouth of the Han, the most important river. It is connected by rail to its port, *Chemulpo*, built at the mouth of the Han, and is on the chief railway of the country. This line runs from *Fusan*, in the south-east, and traverses the whole length of the peninsula, keeping nearer the west than the east coast, and finally effects a junction with the Trans-Siberian line at Mukden.

FORMOSA.

Formosa, or Taiwan, structurally resembles Korea, for it is traversed from north to south by a range of mountains nearer the east coast than the west, giving a steep slope towards the Pacific, and a gradual slope to the west. Its climate is tropical (notice that it is bisected by the Tropic of Cancer), and its vegetation is of the tropical monsoon forest variety, the camphor tree being of great economic value. Tea is cultivated on the slopes of the mountains, whilst on the alluvial western lowlands, rice and sugar are produced.

The inhabitants of eastern Formosa are of Malay

stock, and are very backward indeed. Modern improvements have been chiefly confined to the west, which is inhabited by natives of Chinese descent.

MODERN JAPAN.

In physique the Japanese very much resemble the Chinese, but they are rather shorter in stature. They are not the original inhabitants of their island kingdom, for their ancestors came from the mainland, probably via Korea, very many centuries ago. Earlier inhabitants are to-day found in the north, especially in Yezo and the Kurile Islands, whence they retired before the stronger invaders. These people, who are called *Ainus*, differ from the Japanese. They have wavy hair and long, thick beards, and do not possess the Mongolian eye. There is little doubt that the manner in which the Japanese have adapted themselves to Western ideas is largely due to the fact that, unlike the Chinese, they have come into contact with other peoples (Koreans, *Ainus*, and perhaps even Polynesians), and the infusion of other races has led to a broader and wider adaptability.

In matters of religion the greatest freedom is allowed in Japan. The chief religions are Shintoism (which regards the Mikado as a god descended from the sun-goddess, and is chiefly a worship of ancestors and nature, and a cultivation of intense patriotism) and Buddhism.

The Japanese claim that the present Mikado, a title which by the way, is used by foreigners only, can trace his descent far away back to the great year 660 B.C., when their empire was founded. But the Mikado has not possessed unbroken the power he exercises to-day. In the eleventh century the chief power was wrested from the emperor by military leaders who went by the name of Shoguns, and held the ruling power in successive families. The capital of the Shogun was Tokyo, then called Yedo, and the Mikado was virtually a prisoner in Kyoto. The first Europeans to reach Japan were the Portuguese, who for a time were allowed to

carry on trade. At a later period the Dutch were allowed to trade at Nagasaki only. But the Shoguns never liked foreigners, and at different times rebellions arose, and foreign teachers and their converts, suffered many hardships, even massacres.

In 1854 the United States sent a fleet to Yedo and forced a commercial treaty upon Japan. Other Powers did the same, and treaty ports were opened to foreign trade. Troubles between the Japanese and the foreigners led to revolution and civil war, and it was in this crisis that the power of the Shogun, the military dictator, was overthrown, and the Mikado resumed his authority. This was in 1868, and from that year Japan entered into full relations with the outside world. Reference has already been made to changes which have occurred, and to the ability of the Japanese in carrying out these changes. It only remains to add that Japan to-day is one of the Great Powers of the world. She has learned one lesson from one nation, another from another, always selecting the nation in which that which it was desired to copy was best managed. Not only in her army and navy, which has been so perfected as to surprise Europe by the defeat of Russia in 1905, but in the peaceful field of art, education, commerce and manufacture, Japan has forged ahead. The beginnings of this great step forward were guided by Europeans, but Japan is already able to take almost complete control, for her young men have been trained in the schools and workshops of all the most important countries in the world, whilst at home primary education is compulsory for all, and schools, colleges, universities and technical institutions are provided for higher education.

EXERCISES.

1. On an outline map of Asia mark all the chief rivers and shade the map so as to show the land drained:—(a) to the Arctic Ocean, (b) to the Pacific Ocean, (c) to the Indian Ocean, (d) to the Mediterranean, (e) to areas of inland or continental drainage. Write a brief description of this map.

2. Using the relief map in your atlas, draw a section from the

Ganges plains to the north coast of Asia. Describe its leading features in writing.

3. Why is it that (*a*) Asia Minor receives its rain chiefly in winter, (*b*) the East Indies at all seasons, (*c*) south-east Asia chiefly in summer, and (*d*) the central plateaus are deficient in rainfall?

4. On an outline map of Asia shade all regions receiving a mean annual rainfall of less than 10 inches. On the same map mark the desert lands of the continent. What connections do you notice between the two sets of factors?

5. What are monsoon winds? Draw sketch-map to illustrate their causes, and, in writing, briefly describe the maps.

6. Describe the climatic changes that you would notice in a journey from the Siberian Arctic coast to the Sea of Aral. What other changes, dependent upon the climatic changes, would be observed?

7. What are the leading natural resources of Siberia? State their location, and describe their present state of development. How has the construction of the Trans-Siberian Railway affected the development of the country?

8. What is a rift valley? Draw diagrams to illustrate your answer, and give examples. Using your physical map of south-west Asia, draw (*a*) several transverse sections of the Red Sea; (*b*) a section from Bokhara to Khartoum.

9. What European powers have shown great interest in the affairs of south-western Asia? Can you suggest reasons?

MEAN MONTHLY TEMPERATURE IN DEGREES FAHRENHEIT

Station.	Height in feet above sea-level.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.
Bombay .	35	74.5	75	78	82	84.5	82.5	79.5	79	79	80.5	79.5	76.5	79
Calcutta . .	18	65	70.5	79.5	85	85.5	84.5	83	82.5	82.5	80	72.5	65.5	78
Madras . .	10	75.5	76.5	79.5	84.5	85.5	82.5	84.5	84.5	84	81	77.5	75.5	82

MEAN MONTHLY RAINFALL IN INCHES.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total for year.
Bombay . .	.1	0	0	0	.5	20.5	24.6	15.6	11.0	1.8	.5	0	74.0
Calcutta . .	.3	1.0	1.1	1.5	9.5	11.0	12.3	12.7	10.4	3.0	.6	.3	64.0
Madras . .	.8	.3	.4	.7	2.0	2.0	3.8	4.6	4.8	11.0	13.3	5.2	48.0
Cherrapunji .	.7	2.2	11.1	22.3	52.0	100.0	110.0	77.0	53.5	14.0	1.5	.2	460.5

10. Represent the above statistics graphically, and in writing point out and account for their leading characteristics.

11. What geographical conditions have made the following towns important: Aleppo, Baghdad, Erzerum, Smyrna, Tiflis, Mosul, Aden? Draw sketch-maps in which the conditions are clearly indicated.

12. Obtain copies of the monthly charts of the Indian Ocean (Meteorological Office) and on outline maps of India mark the winds shown on the January and July charts. Account for the leading differences between the two maps.

13. What factors affect the distribution of the population of India? Briefly describe the distribution.

14. How far are the routes of the chief Indian railways controlled by the relief of the land? Illustrate your answer by a sketch-map.

15. How far are the East Indies "Australasian," and how far "Asiatic"? Give reasons for your answer, and draw a map in illustration.

16. Give full reasons why Java is the most densely peopled island in the whole of the East Indies.

17. On an outline map of the British Isles let a small circle, to represent Kaifeng, be marked about the centre of Ireland. On the same scale as the outline map, draw the present and old courses of the Hwang-ho as well as the coastline between the old and the present mouth. This map will give you some idea of what the great change in the Hwang-ho's course meant.

18. What geographical or other conditions have aided the growth of each of the following Chinese cities: Peking, Shanghai, Hankow, Canton? Illustrate your answer by sketch-maps.

19. Why is it that (a) the Hwang-ho is often called "China's Sorrow," (b) A large area of Southern China is covered by trees, (c) The level of the Yangtse is much higher in summer than in winter, (d) China remained until the last few years a country closed to foreigners?

20. Contrast life in the Tibetan plateau with life in the plains of northern India. Give reasons for your statements.

21. Discuss the statement, "Japan is the Britain of the East." To what extent is it appropriate?

22. Using the most suitable physical map in your atlas, draw a section from Mukden in Manchuria to about two hundred miles of east of Tokyo. Describe the leading features illustrated by this section.

23. Mention ways in which the League of Nations can help China.

PART V

NORTH AMERICA

PHYSICAL FEATURES.

NORTH AMERICA is a great triangular landmass (two and a half times the size of Europe), broadest in the north, and tapering in the south towards the narrow isthmus of Tehuantepec, where the continent ends. Except for the northern coastlands and islands, which lie within the Arctic Circle, and the south of Mexico, which lies within the tropics, this great landmass is within the temperate belt. The economic and the human conditions of North America will therefore be very different from those of Africa, and will be more comparable with those of Europe.

A glance at the map will show that the continent contains three great physical divisions—

- (i) The Western Highlands ;
- (ii) The lower Eastern Highlands and their marginal coastal plains ;
- (iii) The Lowlands, occupying the trough between them.

The Western Highlands.—These highlands form a great cordilleran system of north-south running ranges, enclosing high plateaus, which in many respects is comparable to the east and west highland belt which stretches from Asia Minor to China (see p. 285). It is part of the highland belt which forms the marginal lands of the Pacific Ocean. The map shows that it is broadest in the centre, where it occupies about one-third of the total width of the continent. The folded

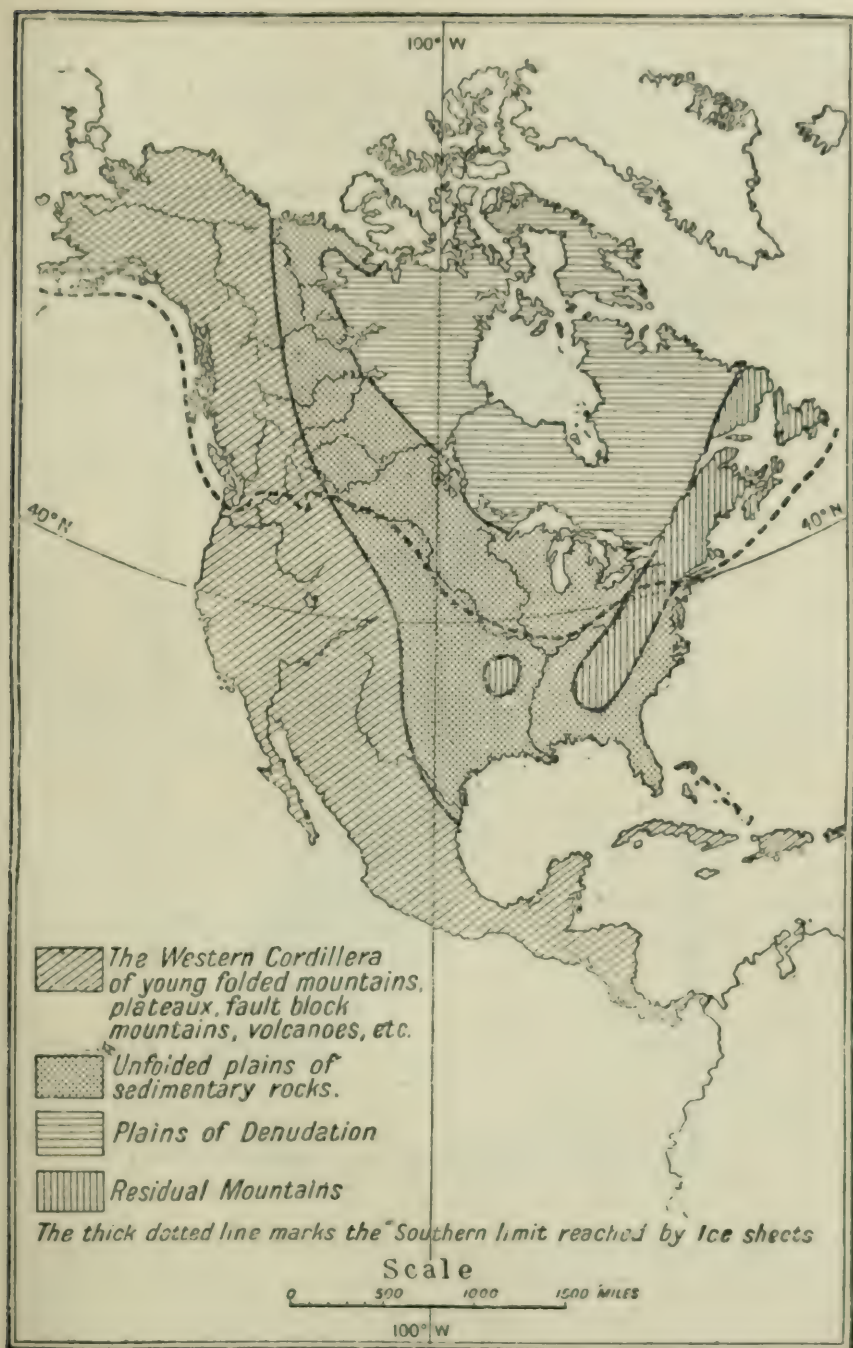


FIG. 95.—The chief structural divisions of North America.

mountain ranges forming the eastern and western buttresses of the system can easily be found on a map by the help of Fig. 96, which also indicates the trough between the main mass and the coastal ranges. In

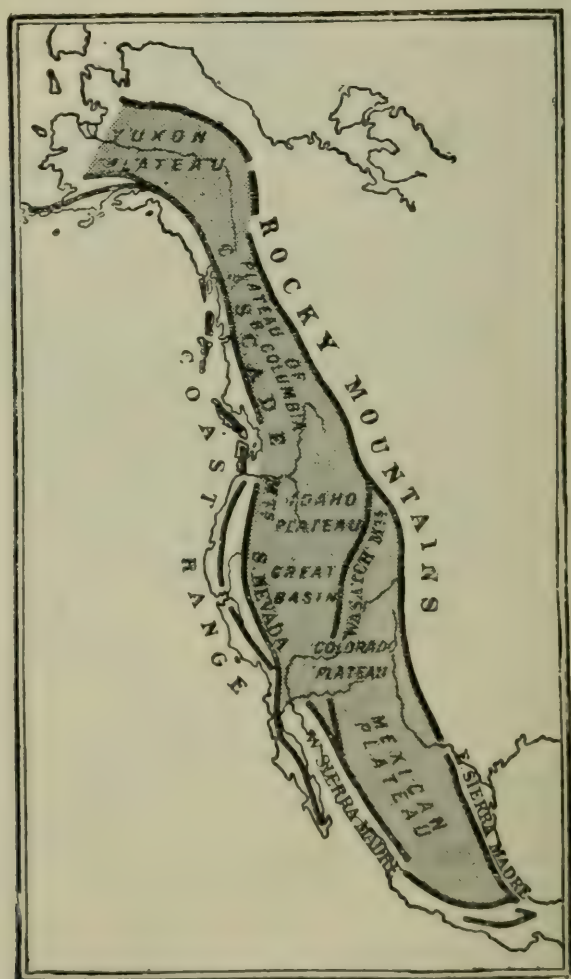


FIG. 96.—Key to the build of Western North America.

the south this trough is represented by the Gulf of California, and in the north by the sea passages between the fringe of islands (the higher parts of the drowned coastal range) and the mainland of British Columbia. It should also be noted very carefully that the plateau

is crossed by many ranges, whose direction is generally north and south.

The Eastern Highlands and Coastal Plains.—This system of highlands extends for about 2,000 miles in a north-east to south-west direction, and may be divided into two, the Northern Appalachians and the Southern Appalachians, by Hudson River. The northern portion is lower than the southern owing to its having undergone subsidence; hence the separation of Newfoundland from the mainland. The southern portion has a more varied relief, as is shown by Fig. 97, which brings out the leading features of the Southern Appalachians, viz. the longitudinal Appalachian valley with the scarp faces of the gently tilted Alleghany Plateau on the

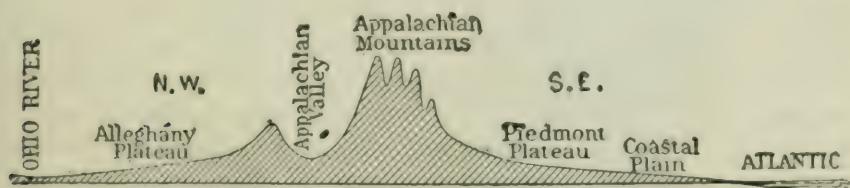


FIG. 97.—A diagrammatic section across the Southern Appalachians.

west and the high Appalachian ridges on the east; the Piedmont Plateau along the eastern base of the Appalachian ridges, and the lower Atlantic coastal plains, which have been made by the gradual uplift of the continental shelf.

The Central Lowlands.—These occupy the trough between the eastern and the western highlands, and stretch from the Arctic Ocean to the Gulf of Mexico. To the west the land rises towards the Rockies, where the high plains are found. The Hudson Bay area in the north (bounded on the south and west by the St. Lawrence and the line of Great Lakes) is the oldest part of the continent, and has undergone the wearing down of countless ages, which has reduced it to a peneplain. The rest of the Central Lowlands are chiefly plains, produced by the uplift of the bed, or the filling up, of former seas. The Ozark Plateau, west of the middle

Mississippi, is a remnant of a much older landmass (see Fig. 95).

The Great Ice Age.—This continent presents many striking examples of the influence of glaciation on a large scale. During the Great Ice Age, sheets of ice of great thickness spread out over the north of the continent. Fig. 95 shows the southern limits reached by them. On the lands their influence is seen in the presence of innumerable lakes of all sizes (the Great Lakes were not in existence before the Ice Age), in the long lines of low morainic hills, in the many waterfalls caused by the diversion of rivers (Niagara is the finest example), in the smoothing and rounding they produced in the land surfaces, and in the character of the soil. It was probably the enormous weight of the ice which depressed the northern part of the continent and caused the complementary uplift in the south, and thus gave us such outstanding features as the remarkable differences between the Northern and the Southern Appalachians; the coastal plains of the south-east; the fiord-like coast of the north-west; the formation of Hudson Bay, and the Newfoundland continental shelf; and the separation of the northern islands from the mainland. Some of these are among the leading features of the continent, and their existence and nature have profoundly affected the human geography.

CLIMATE.

Position, altitude, distances from sea and ocean currents are all important factors in influencing the distribution of temperature in North America. Figs. 6 and 7 show the sea-level isotherms for January and July. At this stage it is only necessary to point out such leading features as (1) the greater cold over the lands in January compared with the seas, and vice versa in July; (2) the vast area below freezing-point in January and the effect of this on navigation by river and canal, and on out-door work; (3) the situation of



FIG. 98.—The seasonal distribution of rain in North America.

the hottest area in July; (4) the "migration" of the isotherms of 50° F. and 68° F., and (5) the greater winter warmth on the N.W. coast compared with the eastern coast in the same latitude, and the connections between this feature and prevailing winds and ocean currents.

The northern part of the continent lies in the westerly wind belt, the southern in the trade wind belt, but due regard must be paid to the influence that a large land-mass has in disturbing the greater regularity with which these winds would blow were the whole area a water-mass. Thus, for example, there is a tendency for winds to blow farther inland in summer, when there is a low pressure system over the land, and that is why the central plains get most rain at that season.

Fig. 98 shows the season at which most rain falls, and as its explanation should present no difficulty, it is not proposed to do more than refer to it. One point brought out by Figs. 14 and 98 is worth noting very carefully, and that is the falling off in the rainfall, both in amount and in seasonal distribution, west of the meridian of longitude 100° W. As we shall see later, this has very important influences upon the character of the farming carried on in the central plains.

NATURAL VEGETATION.

Fig. 99, which shows the distribution of forests, grasslands and deserts, should be studied in its relations to the relief and climate of the continent. We are familiar with all the types of vegetation represented, and the understanding of the distribution of each should present no difficulty. Of course, the map shows the natural vegetation as it would be if man had not interfered, but it should be remembered that in some areas, and particularly in the basin of the Mississippi, large areas of former forest have been cut down or destroyed. The position of the Tundra, the northern coniferous forests, the "Mediterranean" area, the "trade wind" desert and the interior grasslands are all easy to understand. It will be noted that vegetation of a tropical character

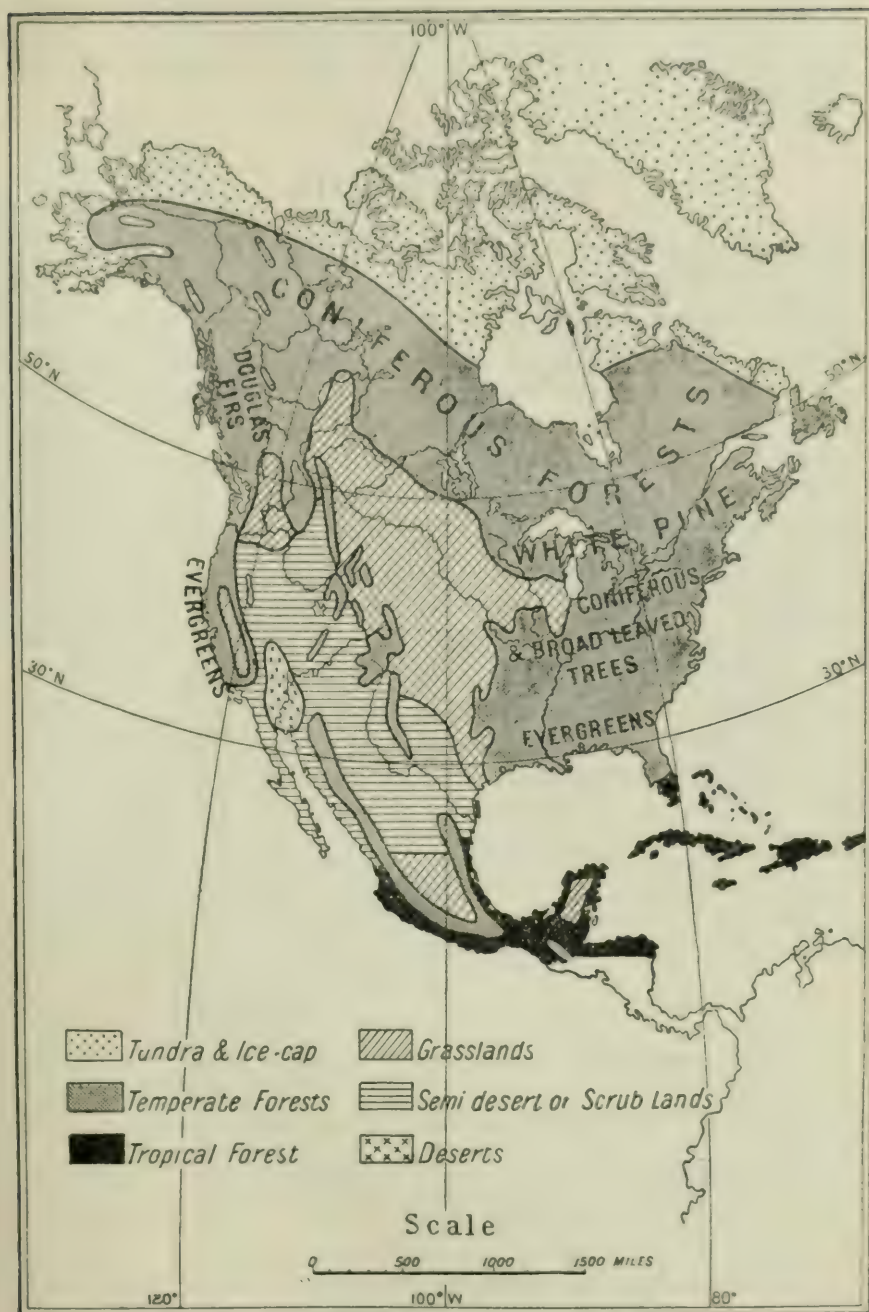


FIG. 99.—The distribution of natural vegetation in North America.

is found in Mexico, Central America and the West Indies—the only tropical parts of the country. Here the prevailing winds are the N.E. Trades at all seasons.

GREENLAND.

This large island was colonized by a few Norse searovers 500 years before Columbus made his great voyage, and it is fitting that it should belong to Denmark. The settlement of Greenland has, however, not been unbroken since then. Except along the southern and south-western coasts, the land is buried beneath a cap of ice of great thickness, a remnant of the great sheets which long ago spread out over North America. It is the outward movement from the interior, where the snows of successive years keep up the pressure and renew the supply of "material," that causes large blocks to break off along the coasts, and thus to give birth to the icebergs which are carried southwards by the Labrador current, to the great danger of ocean liners.

The 13,500 inhabitants are engaged in Arctic fishing and hunting, and the trade is a government monopoly. This is due to a desire to prevent the Eskimos, who form the bulk of the people, from becoming the pawns of white traders, and especially to check the introduction of drinking habits. *Sydproven*, with less than 800 inhabitants, is the largest settlement.

BRITISH NORTH AMERICA: NEWFOUNDLAND.

Newfoundland, whose area is about that of Ireland, occupies an important position at the entrance to the St. Lawrence estuary. Physically it belongs to the Appalachian system, from which it has been separated by subsidence. There are many indications of these two facts, *e.g.* the direction of the prominent physical

features is that of the Appalachian ridges, whilst the presence of a great continental shelf indicates sinking. Indications of glaciation are also widespread. The



FIG. 100.—The fishing grounds of eastern Canada. The shaded parts of the sea are less than 100 fathoms in depth.

greater part of the interior of the island is a low plateau averaging about 500 feet above sea-level.

The climate and vegetation are those found in the

eastern margins in cool temperate latitudes. The winters are cold, the summers warm, and rain falls at all seasons, with a maximum in summer. The natural wealth of the island lies chiefly in its fisheries, forests and minerals.

Fishing is by far the chief occupation. It supports large numbers of both sea and shore workers. The chief fishing grounds are on the Grand Bank where, from June to November, enormous quantities of cod are caught. Herring and lobsters are also very important catches. In spring, sealing off the coasts of Labrador is in full swing. When the sealing season is over many of the more strongly built boats (many boats used by Arctic and Antarctic explorers were formerly used for this purpose) go farther northwards in search of whales and walruses. The shallowness of the sea, and the presence of abundant fish-food (partly brought by currents) are the factors which have made the Grand Bank the world's greatest fishing grounds. They have a long and unbroken history right from the days of their discovery, and one of their chief markets has always been the Roman Catholic countries of Southern Europe.

Forestry has become more important in recent years, and there are now many extensive lumber mills as well as paper and pulp mills. Many of the latter are owned by London newspaper proprietors.

Mining is beginning to be important, and the mineral wealth is believed to be very considerable. Iron mined near St. John's is exported to Sydney in Cape Breton Island, where it is smelted. Extensive deposits of copper, lead and silver have been discovered, and relatively small quantities of the first-named have been mined.

St. John's, the capital, is the centre of the fishing trade. It has important allied industries (curing, packing, extraction of oil, etc.).

Newfoundland is a separate colony and does not form part of the Dominion of Canada. She owns the Labrador coast, where some 4,000 Eskimos manage to

exist by fishing and hunting, and even, by great pains, to raise some hardy vegetables.

BRITISH NORTH AMERICA : THE DOMINION OF CANADA.

THE MARITIME PROVINCES.

The Canadian maritime provinces (Nova Scotia, New Brunswick and Prince Edward Island) form part of the Northern Appalachians. In common with the rest of that system they have been heavily glaciated, so that there are many waterfalls, lakes and morainic deposits, whilst much of the surface has been worn down to a rough plain or peneplain. Notice the Bay of Fundy which, owing to its shape, is noted for its high tides.

Situated in the latitude of Southern France, these provinces have a summer climate resembling that of Northern England and a winter climate comparable with that of Sweden. The natural vegetation consists of mixed coniferous and deciduous forests, the former predominating.

The natural wealth lies in fisheries, forests, minerals and agriculture. Cod, herring, mackerel and lobsters are all important catches. Forestry occupations are particularly important in New Brunswick, especially in the valley of the St. John River. The chief trees are spruce, fir, hemlock, pine and cedar, and the most important lumbering centres are Fredericton and St. John. Mining is most important in Nova Scotia, which has the rich coal and iron deposits of Cape Breton Island. *Sydney* has growing iron and steel trades. Coal and iron are also mined at *Pictou* in the north of Nova Scotia. Agriculture has, however, been the most important occupation in all the provinces ever since the forests were cleared on an extensive scale. Wheat can now be bought more cheaply from the prairie provinces, so that the chief crops are oats, barley and root crops, especially potatoes. Great quantities of fruit are grown

and exported. The apples of the sheltered valley of Annapolis, in western Nova Scotia, are very famous. It is worth noting, in passing, that Annapolis is the oldest town in North America north of Florida. Dairy farming is also a prominent feature of the Maritime Provinces, especially of Prince Edward Island, the "million acre farm." Every English boy and girl has heard of Canadian cheese.

The winter ports of Canada are situated in these provinces. *Halifax*, the capital of Nova Scotia, and *St. John*, the largest city of New Brunswick (Fredericton is the capital) are the chief. They are ice-free, and so, at a time when Montreal and Quebec cannot be reached, they conduct most of the ocean-borne traffic. Halifax is also an important naval port. Both ports are termini of the Canadian trans-continental railways. *Charlottetown*, the capital of Prince Edward Island, has a good harbour, and is the centre of the island's "mixed" farming industry.

THE BASIN OF THE ST. LAWRENCE AND THE GREAT LAKES.

The St. Louis, a small river entering Lake Superior near Duluth, is the head stream of the St. Lawrence, which drains the five great lakes, Superior, Michigan, Huron, Erie and Ontario. Lake Superior is the largest sheet of fresh water in the world, its area being about the same as that of Ireland. The heights of the surface of these lakes above sea-level, in the order given above, is 602 feet, 578 feet, 576 feet, 566 feet and 24 feet. We should, therefore, expect to find hindrances to navigation in the form of rapids or falls, between Superior and Huron and between Erie and Ontario. In the former case we have the rapids of the short St. Mary River, in the latter about 160 feet of the fall is made at the world-famed Niagara Falls. Compared with their great size these lakes are very shallow, for their basins, created largely by the scooping and dumping action of the ice-sheets of the Great Ice Age, are not very deep.

Indeed, if the water were removed their beds would resemble broad plains.

The St. Lawrence and the Great Lakes, with their dependent canals, form a magnificent waterway right into the heart of North America. When the canal from the Ottawa River to the Georgian Bay lobe of Lake Huron is completed, the routes from the shores of Superior, Michigan and Huron to the St. Lawrence estuary and the open sea will be very much shortened (see Fig. 101).



FIG. 101.—The Great Lakes and the St. Lawrence.

Formerly the greater part of this area was forested, and at first hunting and trapping, and later lumbering, were the principal occupations. To-day, extensive areas are devoted to agricultural occupations of different kinds, and mining and manufacturing are also important. If the cargoes of boats passing through the Sault Ste. Marie or "Soo" canals (there are three, two of which are American) were examined, wheat, timber and iron ore would be found to predominate. The grain would be on its way east from Duluth (U.S.A.), Port Arthur and Fort William. The iron ore, which is mined very extensively on the shores of Lake Superior, would

be destined to feed the furnaces at Cleveland and Pittsburgh, both of which are near to large supplies of coal. At Sudbury, north of Lake Huron, there are rich deposits of nickel and copper.

Between Lakes Huron and Erie the St. Clair River has been deepened so as to accommodate large lake steamers. Note the splendid position of the American town of Detroit (the home of the Ford motor-car) for commanding the routes passing from the United States and Canada. Between Lakes Erie and Ontario are the Niagara Falls, which ships avoid by passing through the many-locked Welland Canal. Lake Erie stands on a low plateau which ends in an escarpment near the shores of Lake Ontario. Long ago, when the ice-sheets receded, the falls must have been where the Niagara River fell over this escarpment, but they have now cut their way up-stream for about seven miles. This seven miles is, of course, now a gorge, along which the river races at a great speed.

The falls are an enormous source of hydro-electrical power. Above the brink some of the waters are deflected into sluiceways and tunnels, and the power derived from the rushing water is used in driving machinery to generate electricity, which supplies heat, light and power to neighbouring factories and townships. Cheap power from Niagara is used even so far away as Buffalo and Toronto; for one of the advantages of electricity is that it need not be used just where it is generated.

The Lake Peninsula.—This part of Ontario, the most southerly land in Canada, is almost surrounded by three of the Great Lakes. The soil is fertile, the climate is more equable than that of Montreal, and is altogether more genial than is usual in lands so far from the sea. It is, therefore, little wonder that the Lake Peninsula is the most densely peopled part of Canada.

Agriculture is the chief occupation, and largely takes the form of "mixed" farming. The rich pastures support dairy cattle, and horses are also extensively reared, hence the large crops of oats, the most important cereal.

Fruit growing is very important, the crops including not only apples and pears, but also peaches and grapes. The yield of apples is exceedingly large.

Most of the large cities have engineering (the making of agricultural implements in particular) and manufacturing (*e.g.* biscuit making) industries, whilst those on the Great Lakes engage in ship-building. *Toronto*, excellently placed on Lake Ontario, is the capital of Ontario. It has a rival in *Hamilton*, which in some respects enjoys a

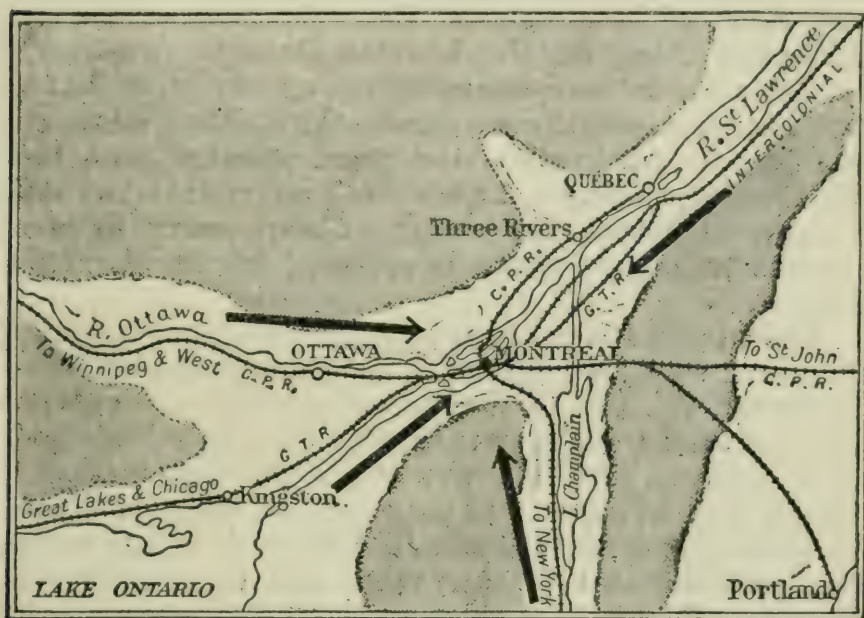


FIG. 102.—This figure shows the importance of the position of Montreal.

better situation. *London* is a growing agricultural centre.

The Lower St. Lawrence.—The St. Lawrence leaves Lake Ontario by a broad channel so studded by wooded islands that it is called the "Lake of a Thousand Islands." Near the eastern end of the lake is *Kingston*, from which the Rideau canal has been built to Ottawa.

Some 160 miles from Lake Ontario stands the city of *Montreal*, the largest in Canada. It occupies a magnificent site, whose value would be still more enhanced were it not

for the winter freezing of the river. The city stands on an island some 1,000 miles from the mouth of the river, at a point where important land and water routes meet, and where lake and river transport gives place to ocean transport, or vice versa. By means of Fig. 102, and an atlas, these routes should be studied in detail (see also Fig. 104, which shows the important land and water routes to New York). When the Georgian Bay canal is completed the importance of Montreal will be still further increased. One disadvantage is, that between the island of Montreal and the right bank of the St. Lawrence there are the Lachine Rapids. Ships can navigate these down-stream but not up-stream, so that it has been necessary to cut a canal—the Lachine—through the island. Montreal is the great summer port, the distributing centre for the country's imports, and an important manufacturing centre. Cheap power for the manufacturing industries is supplied by the Lachine Rapids.

The Ottawa River, which enters the St. Lawrence near Montreal, flows through one of the finest lumbering areas in the world. The Dominion capital, *Ottawa*, stands on its right bank at the confluence with a tributary. Hydro-electric power, derived from falls in both rivers and used in the lumber, paper, and pulp mills of the capital and neighbouring townships like *Hull* on the opposite bank, has made this area the chief centre of these industries in Canada. Ottawa was selected as capital when it was quite a small township because of its central position between Upper and Lower Canada, which were then, as now, the chief centres of population; and also to avoid jealousy between the older centres of Toronto, Montreal and Quebec.

Below Montreal the St. Lawrence flows through prosperous farming communities devoting their energies to the growing of fruit and vegetables, to the rearing of animals and to the production of dairy produce, on farms located in places which, not many years ago, were forested and devoted to hunting and trapping. *Quebec* is the largest city below Montreal. The old city (a bit

of old France in the New World) was built on a promontory (the famous Heights of Abraham) which projects from the left bank, so that the river is narrowed to about three-quarters of a mile in breadth. The modern commercial city is at the foot of the promontory. The suitability of the city's name, which is an Indian word meaning "narrows," is apparent. Below Quebec the river rapidly widens. It is clear that here we have the ideal site for the "fortress" type of city, and it is as a fortress that Quebec has always been most important. In recent years its trade has suffered owing to the improvements which have been made in the navigation of the St. Lawrence which allow larger vessels to reach Montreal. It has lost its former pre-eminence as a lumbering centre, but it retains its manufactures of leather and of boots and shoes.

Below Quebec the St. Lawrence gets broader and broader. At *Rimouski*, a small packet outport on the right bank, it is 25 miles wide. An older lower course and mouth are indicated on Fig. 100.

THE CENTRAL LOWLANDS: THE HUDSON BAY REGION.

This region is bounded on the west and south by the chain of large lakes lying about a curved line passing through Great Bear Lake, Lakes Winnipeg and Superior, and on the south-east by the St. Lawrence. The oldest part of the continent, it is an area which has been greatly worn down during the ages, for it was once a highland region. It consists of hard rock, and many of the lakes on its margins have been formed where softer, soluble rocks adjoin this ancient peneplain (see Fig. 95). The surface of the region is dotted by thousands of lakes, both large and small, and most of these owe their existence to the action of ice-sheets in scooping out hollows or in barraging rivers.

The whole area may be compared to a huge saucer. Subsidence has taken place in the north, where the "saucer edges" have been broken and the sea has been

admitted, so that parts of the rim now appear as islands, and the lowest part of the saucer as the inland Hudson Bay.

In the north the Hudson Bay region is barren tundra, inhabited by small bands of Eskimos. Most of the rest is covered by coniferous forests, although there are many areas in the south where the forests have been cleared and agriculture is carried on. Hunting and trapping are the chief occupations in the valleys of the rivers flowing into Hudson Bay. At small trading centres like Fort Churchill and York Factory, the skins of such animals as the deer, fox, ermine, sable, beaver and bear are bought or bartered in exchange for food, clothing, guns and ammunition. Some of the trapping is done by Indians, but the white trappers exceed the Indians both in number and in skill.

The region has few people, for the tundra and these northern forests cannot support large communities. The projected National Railway from Winnipeg to *Port Nelson* will bring a new importance to the Hudson Bay ports, for if ships can only reach them for a short time each summer, it is just the time that they can assist in the exportation of grain from the prairie provinces.

THE CENTRAL LOWLANDS: THE PRAIRIE PROVINCES.

These are the provinces of Manitoba, Saskatchewan and Alberta. Only the southern portions of these provinces, however, are grasslands or prairies, for their northern territories include part of the great belt of northern forests which stretches across Canada south of the tundra. It is, however, on the prairies that most of the people are found, and it is to that part of the Central Plains that we shall direct most of our attention.

Southern Alberta and Saskatchewan are drained by the two Saskatchewan rivers and the Assiniboine River to Lake Winnipeg, which also receives the important Red River. The Nelson completes the system by carrying off the surplus water to Hudson Bay. Lakes Winni-

pegosis and Winnipeg are fragments of a former vast lake which included them both. When, towards the end of the Great Ice Age, the receding ice-sheets still covered Hudson Bay and the present Nelson River, a great lake, drained southwards to the Mississippi, was held up in front of it. Very gradually the ice receded, and finally the Nelson River re-established itself and drained the lake to Hudson Bay, but not before rich deposits of clay and silt had been spread over its floor. These have been enriched by mould or loam, and are now the noted wheat lands of Manitoba and the Red River valley—the richest lands on the continent.

The Canadian prairies have the typical climate of lowlands in the interior of a great landmass, *i.e.* the range of temperature is extreme, and the greater part of the rain falls in summer (see statistics on p. 30). The ground is frozen hard in the winter, so that from November to April ploughing and most other outdoor operations must be suspended. Thus Canadian wheat is chiefly spring-sown. Nearer the Rockies, where the influence of the Chinook Winds (see Fig. 13) are felt, the warmer conditions make it possible for some winter-sown wheat to be grown. The long, warm summers, with the rain falling in the early part, and the ripening and harvesting months dry and sunny, are ideal for cereals, especially wheat.

Even in Alberta, where the drier conditions were at first more favourable to the rearing of cattle, sheep and horses, these pursuits are now secondary to agriculture. It is, however, still true to say that pastoral occupations increase in importance as we go west, whilst wheat-growing decreases. In all parts mixed farming is becoming more and more popular.

The development of the Canadian prairies has been largely bound up with the construction of means of communication, especially of railways, for it is not profitable to farm land far removed from means of transport. The triangle "Winnipeg-Edmonton-Calgary" is a network of railways, along each of which there are hundreds of small townships.

Winnipeg is both the "Gate to the East" and the "Gate to the West," for it commands all the trans-continental routes. It has grown out of Fort Garry, the trading station established by the Hudson's Bay Company at the confluence of the Red and Assiniboine Rivers, some 50 miles south of Lake Winnipeg. Founded because of its command of water routes, it is now the chief railway centre in the interior of the Dominion, whilst the development of the rich lands on the floor of the ancient Lake Agassiz has made it the great Canadian grain and farming centre, and has given it such allied industries as the manufacture of agricultural implements, flour-milling and leather-making. It still retains considerable importance as a fur-trading centre.

Leaving Winnipeg by the Canadian Pacific Railway, the chief towns passed through before the Rockies are reached are Brandon, Regina, Medicine Hat and Calgary. *Brandon* is a smaller Winnipeg. *Regina*, the capital of Saskatchewan, is a rising agricultural and stock centre, with growing manufacturing industries. *Medicine Hat*, in Alberta, being farther west is relatively more important for stock-rearing, but in recent years the discovery of rich supplies of natural gas has made it a busy manufacturing centre. Incidentally it should be noted that Alberta is very rich in coal—estimated by one authority as 15 per cent. of the world's supply—so that there is abundant scope for future development. *Calgary*, the centre of a great ranching country, is now also noted for its agriculture, and particularly for wheat. It stands on the Bow River tributary of the South Saskatchewan, in a good position for commanding the routes to the Crow's Nest and Kicking Horse Passes.

If the journey from Winnipeg to the Rockies were made by the National Trans-Continental main line, we should pass through Saskatoon and Edmonton. *Saskatoon* is a rapidly growing farming centre. *Edmonton*, the Albertan capital, grew up as a trapping centre on a portage between the North Saskatchewan and Athabasca Rivers. It commands the Yellowhead Pass, by

which the National Railway crosses the Rockies on its way to Prince Rupert. It is the centre of a rich agricultural and stock-raising country.

THE WESTERN HIGHLANDS: BRITISH COLUMBIA.

In this province the sunken coast range (represented by islands), the drowned trough between the islands and the coast, the Coast Range (a northern continuation of the Cascades), the great plateau between the Coast Range and the Rockies, crossed itself by many ranges running in the prevailing north and south direction, are all well marked (see Figs. 13 and 96). The only lowlands are along the lower Fraser valley.

The climate naturally varies with local conditions of relief, but the most equable parts are the southern coastlands, where the conditions are very similar to those of western Britain, whilst the most extreme climate is experienced on the plateau. The prevailing winds are the westerlies, so that most rain falls in the west. What obtains is that all the north and south ranges receive rain-bearing winds, but that the amount diminishes towards the east, whilst the intermont plateaus are deficient in moisture (see Fig. 13). This is indicated by the density and character of the forests, as well as by the magnificent glaciers of the Selkirks, where the snowfall exceeds that of the Rockies. Thus we have a series of wet and dry belts.

The economic development of this province is in its infancy, for the chief occupations are those more or less simple industries related to the predominant sources of natural wealth. The structure of the coast, with its island guard, its sunken plain and its fiord coast, would lead us to expect *fishing*. But in addition to the sea fisheries, which are carried on not only in home waters, but in the far-afield waters of Bering Strait and the Arctic Ocean, the rivers yield an enormous harvest, especially of salmon, for which

the Frazer River is world-famed. Salmon, sea- and river-caught, form the bulk of the whole catch, but herring and halibut are important. The canning trade provides work for a large number of people, the chief centre being New Westminster, near the mouth of the Frazer. Victoria is the headquarters of a fur-sealing fleet, whose chief "hunting-grounds" are in Bering Strait.

Another natural occupation is *lumbering*. This is increasing, for there is a great demand for wood from the untimbered prairie provinces, as well as from the United States. The giant of the forests is the Douglas Fir. In a well-watered, mountainous country there is no lack of power with which to carry on the various lumbering and allied processes.

Provided, of course, that the rocks were such as are associated with mineral wealth, we should also expect to find *mining*; for the folding of rocks and the action of rivers tend to expose minerals, or at least to facilitate mining operations. Coal is mined very extensively in Vancouver Island and in the neighbourhood of the Crow's Nest Pass. The former supplies the needs along the coast, either for industrial or transport purposes; whilst the latter supplies the Canadian Pacific Railway and the gold, silver, copper and lead-mining area now developing in the neighbourhood of Rossland.

Finally we have *agriculture* which, even in this mountainous country, is very important. The chief centres, *e.g.* New Westminster, are found in the plains of the lower Fraser, but the introduction of irrigation to the dry intermont belts is extending the cultivated area. The province is noted for fruits, especially apples and pears, and land in increasing amounts is being devoted to fruit-growing. Wheat and other temperate cereals are also grown.

The provincial capital is *Victoria*, on Vancouver Island. It has a splendid harbour and important lumbering and fishing industries. Not far away is the Pacific naval base of Esquimault, in whose vicinity coal and iron are

mined. *Vancouver*, the largest city in the province, has grown with great rapidity since it was founded in 1886 when a site was needed for the terminal port of the Canadian Pacific Railway, and a deep-water harbour at the mouth of the Fraser was selected. It is the outlet of the richest part of the province, as well as a starting-point for steamers going to and from Australasia and the Far East. *Prince Rupert*, the terminus of the National Trans-Continental Railway, is a still newer port.

Railway construction, especially in an east-and-west direction, is no easy task. The two principal railways cross the Rockies by the Kicking Horse Pass (C.P.R.) and the Yellowhead Pass (National Railway). The chief obstacles are the north and south ranges. An atlas map will show that the rivers run along the longitudinal valleys between the ranges (*cf.* the upper Fraser and Kootenay), and in places find their way through transverse valleys, where they have formed gaps. The railways utilize these valleys and gaps as a means of reaching the coast. The close relations between relief and routes should be studied very carefully in the cases of the National Trans-Continental line from Edmonton to Prince Rupert (note the branch to Vancouver), and of the C.P.R. from Calgary to Vancouver.

Yukon.—The Yukon Territory will ultimately be absorbed by British Columbia. Its very small population is chiefly engaged in mining for coal, copper, silver and gold. Of these gold is the most important, for the Territory includes the famous mines in the basin of the Klondike tributary of the Yukon. The three thousand inhabitants of *Dawson City*, the centre of the mining industry, number over one-third of the total population.

As this part of Canada is developed, there will be found many parts capable of supporting lumbering and fishing industries. The development of the Territory will always be a difficult matter, not only because of the character of the region itself, but also on account of the fact that its Pacific coastlands form part of Alaska, which belongs to the United States.

CANADA: HISTORICAL NOTES.

The first Europeans to visit Canada were the Norse sailors, who founded colonies in the East long before the eventful voyage of Columbus. Newfoundland was discovered in 1497 by Cabot, but settlements were not made until the end of the next century. In the meantime, French explorers were pushing their way into the interior by means of the great St. Lawrence waterway. Jacques Cartier made three voyages of discovery, on the second of which he reached the island of Montreal, whilst Champlain at the beginning of the seventeenth century founded Quebec, and explored the various rivers leading from the St. Lawrence into the interior. These men led the way for a French settlement of the basins of the St. Lawrence and the Mississippi.

The conquest of Canada was entered upon by England in defence of the American colonists, for eventually the latter crossed the Appalachian barrier and reached the central plains. Conflicts took place, not only in this area, but along the St. Lawrence, and the French took steps to keep the English on the east coast plains, hoping at some future time to drive them out of the continent altogether. The fall of Quebec ended the American part of the Seven Years' War, and the Treaty of Paris, signed in 1763, transferred Canada to England, with the exception of two small islands in the Gulf of St. Lawrence which are still held by France.

The Great War of Independence took place only sixteen years after the capture of Quebec, and during that time an attack on Quebec was frustrated. At the close of that war those American colonists who had remained loyal to England, were stripped of all lands and possessions. About 30,000 were shipped to Nova Scotia, whilst very many settled in what is now the province of Ontario, and founded the town of Kingston. In this way the valley of the St. Lawrence became inhabited by the French in its lower half, and by the English in its upper half. These areas became known

as Upper and Lower Canada, and to-day correspond roughly to the provinces of Quebec and Ontario.

At the beginning of the nineteenth century there were settlements in Upper and Lower Canada, the maritime provinces of Prince Edward Island, Nova Scotia and New Brunswick, and in Newfoundland. The west and north-west were almost unknown. In 1670 the Hudson's Bay Company had been founded. It acquired rights over the whole of the area draining into Hudson Bay, and later over lands farther west. The fur traders resented any interference or attempts at settlement, and until 1869, when the Government took over the Company's rights, very little had been done in the way of settlement or development west of Upper Canada, excepting in British Columbia, where the Californian gold rush of 1849 was succeeded by one to that province in 1857.

Thus, in 1867, when the Dominion of Canada was formed, British Columbia was entirely shut off from the east, for there was no road across the prairies and the Rockies. British Columbia joined the Dominion because of the promise to construct a great railway across the continent. The only province to refuse to enter the Dominion was Newfoundland, which still stands out.

We have seen that Canada is a vast land containing extensive territories which can never support many people. On the other hand there are lands whose economic development is in its infancy. Such parts of Canada are certainly lands of opportunity and of effort, and as such, should be particularly attractive to Britishers. The total population is only just over eight millions—the population of Greater London. Of these, three-quarters are in the St. Lawrence basin and the maritime provinces (chiefly in Ontario and Quebec); one-fifth are in the Central Lowlands, and one-twentieth in British Columbia and Yukon. In the near future the bulk of the newcomers will go—or should go—to the prairie provinces and to British Columbia.

THE UNITED STATES.

THE NORTHERN APPALACHIANS: THE
NEW ENGLAND STATES.

In the United States, as in Canada, three great physical divisions—the Western Highlands, the Central Lowlands, and the Eastern Highlands—are well marked, although we must notice that the Western Highlands are much broader than in Canada, whilst there are broad margins of lowlands between the Eastern Highlands and the Atlantic Ocean.

We are familiar with many of the chief features of the New England states. We have learned that the Northern Appalachians have sunk, and if the coastline of New England is examined, it will be seen that this sinking has made it very irregular, and thus it has formed good harbours. There are also very many lakes and waterfalls, many moraines, whilst much of the surface is boulder strewn. Near the coast the land is low, but towards the west and north it rises to the Green and White Mountains. The direction of the drainage is south or south-east, the rivers occupying wide longitudinal valleys.

When the Pilgrim Fathers settled here in the seventeenth century, these states were much more forested than they are to-day, and *lumbering* and *shipbuilding* were among the earliest industries. *Fishing*, too, was one of the first occupations, for the character of the coast helped this. Agricultural development has always been at a disadvantage on account of the stony nature of much of the glacial soil. Moreover, the agricultural development in the prairie lands of the west, where the physical and climatic conditions are more favourable, has made it unnecessary for the eastern states to grow all their own wheat. For these reasons *agriculture* is confined mainly to fruit-growing, and the production of milk, butter, cheese, eggs and vegetables, all of which are easily sold in the large cities. It will be recalled

that lumbering, fishing and mixed farming are the chief occupations in the Canadian maritime provinces, especially in New Brunswick. But New England has gone a stage further, for it is the chief *manufacturing* section in the United States, and this in spite of the fact that most of its raw materials for manufacture have to be imported. One reason for this is the great supply of water and hydro-electric power provided by the numerous falls and rapids. But large numbers of the mills and workshops are worked by steam-engines, for the inhabitants have become so skilful in manufacturing that their trade has enormously increased beyond the power capacity of their waterfalls, despite the fact that in New England neither coal nor iron is found. The chief manufactures are *cotton, wool, leather, and iron*. Cotton is brought by water from the southern states, wool from Ohio and the states further west, as well as from Argentina and Australia. Leather making was one of the earliest manufactures, and is aided by the abundance of trees whose bark gives the tannic acid used in tanning. The manufacture of boots and shoes is the most important branch of the leather trade.

Owing to the fact that iron is not found in New England, and that coal has to be brought from other states, the metal manufactures are, as a rule, those which require little raw material but considerable skilled labour. In this respect they may be compared with similar industries in Switzerland. Thus, articles such as jewellery, watches, clocks and firearms are manufactured. The watches made in Waltham and Waterbury are sold all over the world. Who has not heard of an Ingersoll?

The largest and most important city in New England is *Boston*, which has a splendid harbour located at the junction of several drowned river valleys. It is a busy collecting and distributing centre for the manufacturing towns of its hinterland, *e.g.* Manchester, Lowell and Worcester. It is a great manufacturing town, especially of clothing. Its drawback is, that in order to reach the Mohawk Gap, mountains have to be crossed or tunnelled, thus making the approach to the Central

Plains much more difficult than from New York, and therefore enabling the latter to outstrip Boston in importance. Nevertheless, Boston exports a considerable amount of meat and grain from the Central Plains.

Portland, in Maine, is the nearest ice-free port to Montreal and derives much benefit from this advantage of site. It is an important fishing and shipbuilding centre. *Fall River* on the south coast, as will be gathered from its name, obtains power from falls. It is the chief cotton manufacturing centre, and has the extra advantage of having a harbour deep enough to accommodate the ships which bring its raw materials. It also has woollen mills. *New Haven*, the largest city in Connecticut, is on Long Island Sound. It contains Yale University, founded in 1701. Yale and Harvard are the Oxford and Cambridge of America. Harvard, founded in 1613, is at Cambridge, only three miles from Boston. They are the two oldest American Universities. New England prides itself on its intellectual leadership of the country.

THE SOUTHERN APPALACHIANS.

The striking differences between the Northern and the Southern Appalachians are largely due to the fact that the former have been heavily glaciated and have experienced sinking, whilst the latter have never been glaciated and have been uplifted. We have seen that the sinking in the north was related to the rising in the south (see p. 366). One striking result is that whereas north of the Hudson there is a certain uniformity in the geographical features, to the south we find marked contrasts between the Alleghany plateau, the Central Valley, the Appalachian ridges, the Piedmont plateau, and the Coast Plains. (See Fig. 97.)

The Fall Line.—The Piedmont plateau, east of the Appalachian ridges, is an old peneplain which has been uplifted, thus causing the rivers which cross it to deepen their valleys. As this area has not been glaciated, the soil remains, and as it is very fertile, it forms splendid

agricultural land. When the rivers leave this belt of old hard rock, they meet the newer softer rocks of the uplifted coastal plains, and this difference in hardness has caused the rivers to make waterfalls. Many of the most important cities of the country are on this Fall

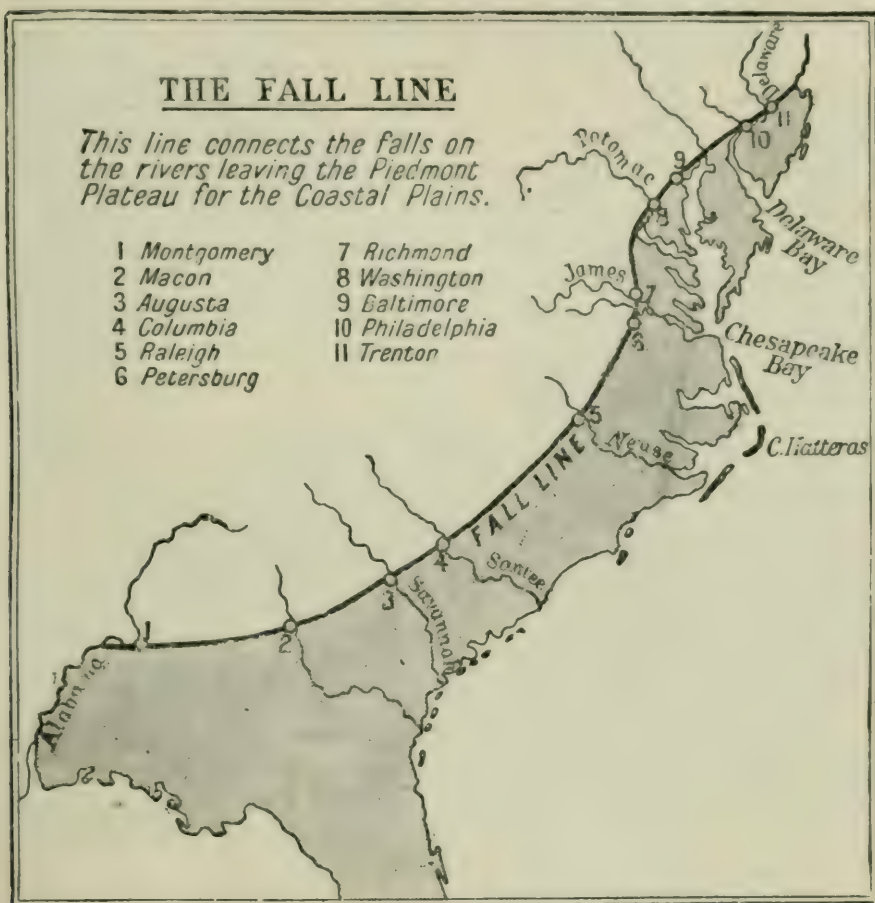


FIG. 103.—The Fall Line.

Line, for power for manufacturing can be obtained there. (See Fig. 103.)

The Coastal Plains vary from 30 to about 100 miles in width. They have been formed by successive uplifting and sinking. At one time uplift would take place, and part of the sea bed would become dry land.

At another time sinking would take place, but not all of the previously uplifted land would be submerged. It is probably recent sinking which has produced the estuaries of Chesapeake and Delaware Bays. This uplifting and sinking must have taken place many times, and thus the new land which has been added is in great belts roughly parallel to the seashore. These belts are not always of the same material, some being of sand and some of clay, so that owing to differences of soil there are differences of vegetation and of occupation. The sandy belts are usually pine forested, and lumbering is important, whilst the more fertile areas are cultivated.

On the older and harder lands of the Piedmont plateau, the rivers are small and rapid, and often not navigable even for a small canoe; but on their plain courses they broaden, flow slowly, and generally have broad estuaries navigable for large ships. The lower courses of these rivers are tidal, and thus towns have grown up at the tidal limit, and if this should be at the Fall Line, as in the case of Philadelphia, Baltimore, Richmond and Washington, the town has a double advantage of site.

The last belt to be uplifted was the coastal one, and this is usually marshy, but where the climate is suitable it can be used for the production of rice, which forms such an important part of the food of the large negro population of the south-eastern states.

The coast is fringed by many islands which enclose lagoons between them and the coast. Notice Cape Hatteras, which has been formed by the joining of two of these. In the course of time the lagoons will be filled by blown sand, vegetation, etc., and thus the islands will be attached to the mainland.

Routes across the Southern Appalachians.—The parallel ridges and valleys of the Appalachians are very well marked, and formed serious barriers to communication from east to west until railways were constructed following rivers which have cut gaps in the ridges. The chief are those which follow the Hudson, Delaware, Susquehanna and Potomac rivers, and of these by far the easiest is the Hudson route. The old bed of the Hudson can be

traced to the edge of the Continental Shelf, and the submerging of the lower parts of the river has given to New York a protected harbour behind Long Island. The first settlement on this important site was made by the Dutch, who called it New Amsterdam, a name which was afterwards changed to New York on its

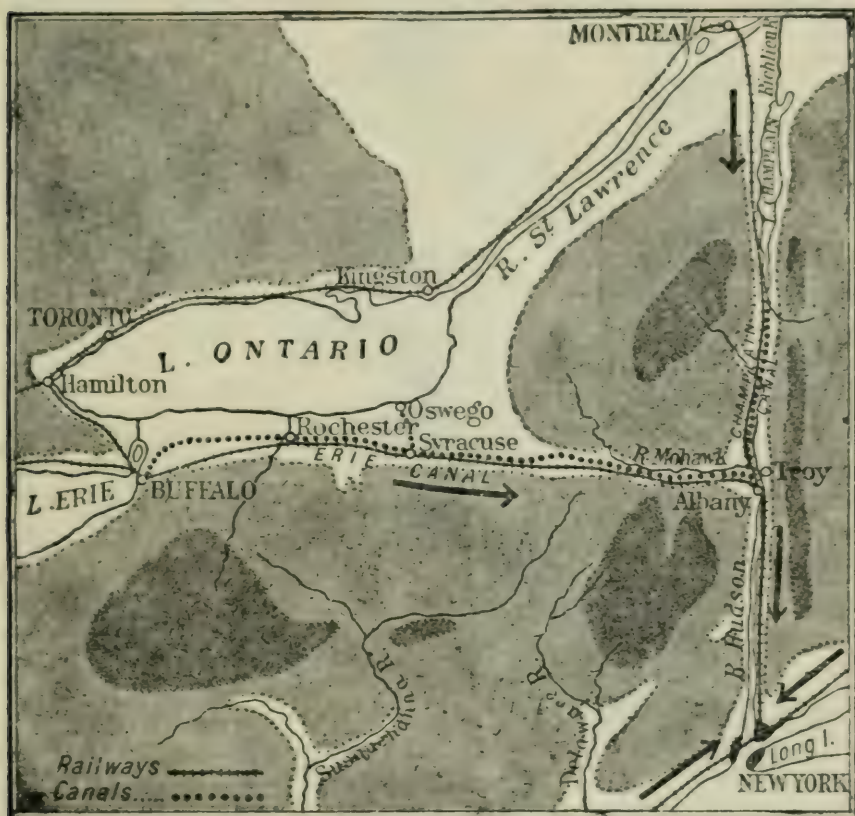


FIG. 104.—The Hudson-Mohawk Gap. This figure illustrates the importance of the position of New York.

capture by the English in the reign of Charles II. What has made modern New York the second largest city in the world, and far away the most important port in America, is the unrivalled combination of a splendid harbour facing the chief European countries, and easy lines of communication with the St. Lawrence, the Great Lakes and the Central Plains. Fig. 104 shows

that following the lines of the Hudson-Richelieu and the Hudson-Mohawk are low routes right through the Appalachian barrier. Notice the position of Albany which is at the tidal head of the Hudson. From here canals to Buffalo (Erie Canal) and to Lake Champlain

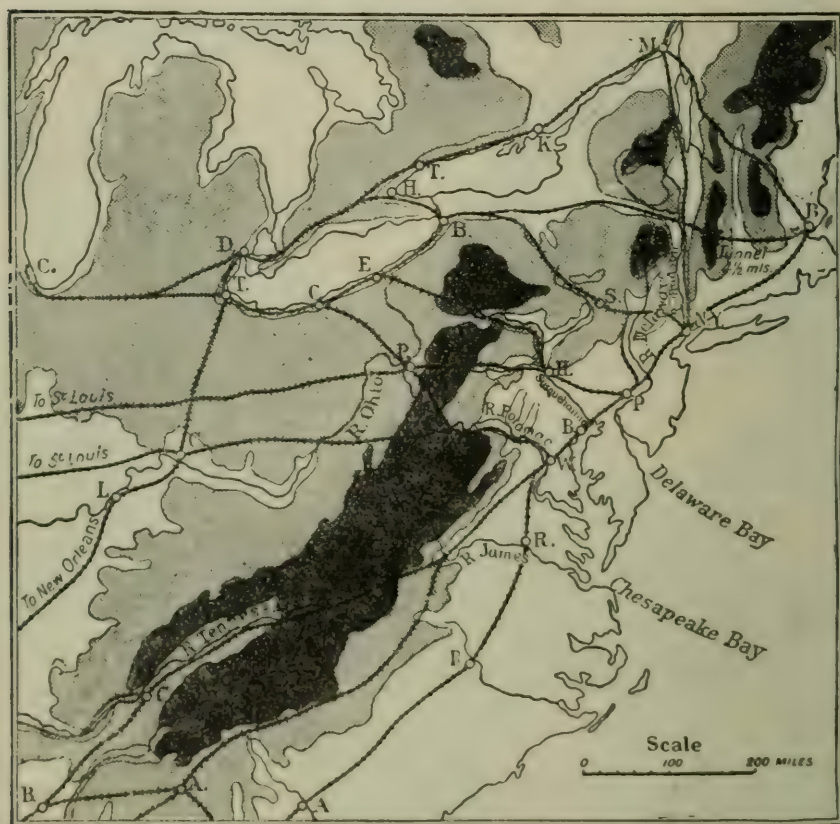


FIG. 105.—Chief routes of eastern United States. Notice (1) the railway keeping to the eastern plains; (2) the value of river valleys as routes across the mountain barriers; (3) the value of the Appalachian valley as a route.

(Champlain Canal) give water communication between New York and the Great Lakes and the St. Lawrence. These routes are followed by railways, the Mohawk Valley being followed by no less than seven lines, and although many lines now cross the Appalachian barrier, the easy gradients of this route still give it pre-eminence.

New York is also a great manufacturing centre, and, as at Boston, one of the most important is the manufacture of clothing. Iron and coal are found near at hand, and the making of iron goods of all kinds is also engaged in.

Other routes across the Appalachians are shown on Fig. 105, the most important being those following the valleys of the Susquehanna and the Potomac.

Philadelphia.—This city, the capital of the State founded by Quaker settlers, enjoys the advantages derived from its location on the fall line of the Schuylkill and at the tidal limit of the Delaware. Being near to coalfields it supplies coal to places along the Atlantic coast, especially to New England, whilst it is itself a great centre for the manufacture of machinery, locomotives and steel ships. It has excellent railway connections with the cities to the north and south, whilst it is connected with Harrisburg and Pittsburg by lines crossing the Appalachians.

Baltimore.—Like Philadelphia, this city, which is the capital of Maryland, a state founded by Roman Catholics, has the double advantage of being at the tidal limit and fall line of an important waterway. It is near to the coal and iron districts, and has become a great cotton and iron manufacturing town.

Washington was not founded until after the War of Independence. Its makers knew that one day it would become a great city, and so it was carefully planned and to-day is one of the most attractive cities, not only in North America, but in the whole world. Its position on the Atlantic seaboard is accounted for by the fact that when it was founded in 1800, it was about the centre of the then settled area. Its great buildings are not factories or workshops, but government buildings, the chief of which is the Capitol, in which the National Assembly meets.

Richmond, the chief city of Virginia, the State founded by English Churchmen, stands at the tidal limit and on the fall line of the James, and has easy means of communication with the central plains. Virginia is a great tobacco-producing state, and Richmond is the chief

centre for this trade. Cotton is grown, although in insufficient amounts to supply the local needs. The chief cereals produced are maize and wheat, the former being five times as important as the latter.

The states of North Carolina, South Carolina, Georgia and Alabama are southern Appalachian marginal states, but in climate and products they are so much like the southern Mississippi states, that their consideration will be delayed until the next section.

Notice the position of *Atlanta* (Ga.), the largest city in these four states. It is one of the few large cities away from a river, and is known as the "Gate City." In the south-east of the Appalachians there is no easy pass across the mountains, and so Atlanta has grown up at a meeting-place of routes at the southern extremity of those mountains. (See Fig. 106.)

THE CENTRAL LOWLANDS.

In the north of the central lowlands of Canada there are the Barren Lands, and these merge into a forest belt, which in turn gives way to prairies, in the cultivated parts of which wheat is the chief crop. This wheat belt or zone stretches on both sides of the international boundary line. As we proceed southwards the temperature increases, so does the rainfall, and with these changing climatic conditions there are changes in the typical products. In the Upper Mississippi basin are the wheat-lands; in the belt including the lower basins of the Ohio and Missouri and the central basin of the Mississippi, the chief crop is maize or Indian corn, whilst in the Gulf and southern Atlantic States cotton is the predominant crop. West of Long. 100° W. the High Plains are drier, and cattle-rearing is more important than the growing of cereals. (See Fig. 106.)

THE WHEAT BELT.

This comprises the Upper Mississippi Basin and the states immediately south of the Great Lakes. The

climatic conditions are similar to those of the Canadian wheat-lands, and as in Canada the best lands are in the valley of the Red River, on the floor of an ancient glacial lake. Oats and barley are, of course, also very widely grown in this belt. *Minneapolis*, located near the Falls of St. Anthony, at the navigation limit of the Mississippi, is the chief milling centre in America. It is also noted for lumbering. Both these industries benefit from the power derived from the Falls. *St Paul* is a distributing and collecting centre for the smaller agricultural cities in the vicinity, and with Minneapolis makes a great "twin" city. *Milwaukee*, on Lake Michigan, consumes great quantities of grain in its brewing industries.

Two important outlets for the crops of the wheat belt are *Duluth* and *Chicago*. The former is the centre of a region producing timber and iron as well as wheat, and exports these in great quantities. Other large towns in this belt, and also on the Great Lakes, are *Detroit*, on the St. Clair river, between Lakes Huron and Erie, at a point where the roads and the railways from the Lake Peninsula cross into the United States, and *Cleveland* and *Toledo*, on Lake Erie. The latter has ironworks and flour mills, whilst Cleveland is one of the largest and busiest towns on the Great Lakes. Its inhabitants are engaged in the building of lake steamers, in the manufacture of iron and steel goods, and in the refining of petroleum, these being in addition to a considerable trade in grain and lumber.

THE MAIZE OR CORN BELT.

Ohio, Indiana, Illinois, Iowa, Missouri, Kansas and Nebraska are the chief maize-growing states, although other crops, such as wheat, oats, barley and tobacco, are by no means unimportant. This zone has longer, warmer summers than the wheat belt, and that is why maize becomes of first importance. It is used for many purposes, but chiefly for the feeding of cattle and hogs, for the distilling of whisky, and for making into bread.

The slaughtering of cattle and hogs is very important in the towns of Omaha, Kansas City, Chicago, St. Louis



FIG. 106.—The Central Plains.

and Cincinnati. The meat is packed in cans and sent to all parts of the country and to Europe.

But this central Mississippi basin is not only important for its maize, cattle, hogs, etc. Parts of it are rapidly becoming great industrial areas. Fig. 106 shows (i) a coalfield on the margins of the Alleghany Plateau; (ii) a second, chiefly in Illinois, between the Mississippi and the Ohio; and (iii) a third farther west.

Besides coal, there are rich deposits of oil and natural gas, but these are not as widespread as the coal deposits, although great quantities are obtained in Western Pennsylvania, West Virginia, Ohio, Indiana, and other states in this belt. The result of the discovery of these valuable minerals has been that the population in the Central States has increased enormously, and towns like St. Louis, Chicago and Cincinnati, which were formerly agricultural and slaughtering centres only, are now great manufacturing cities.

Chicago.—At the beginning of the nineteenth century it was a small French trading port named Fort Dearborn, built where a small river, the Chicago, enters Lake Michigan. A glance at the map will show that all routes from the east coast, north of Chesapeake Bay, would have to pass round the end of Lake Michigan and through Chicago in order to proceed north-westwards. The city is also excellently placed for commanding the routes to the Mississippi basin and for handling trade passing along those routes eastwards via the Great Lakes. It is within easy reach of coal, whilst iron ore can be brought by water from the shores of Lake Superior. It has, therefore, become a great engineering centre, especially for the making of railway stock, agricultural implements and machinery. Its position with regard to the wheat, maize, and stock-rearing areas has made it a great grain port, as well as the largest of all the towns engaged in slaughtering and canning.

Pittsburg has a splendid site at the confluence of the Alleghany and Monongahela rivers, the headwaters of the Ohio. The Alleghany gives routes to Lake Erie, the Monongahela and Potomac an easy route across the Appalachians, whilst the Ohio leads westwards to the Mississippi. Originally a French fort, Fort Duquesne,

it has grown enormously since the development of the great resources of coal, iron, oil and natural gas of the district. Its iron and steel works cover a very large area. The local supplies of iron ore are insufficient, and the deficiency is supplied by ore brought from the shores of Lake Superior.

THE COTTON BELT.

The lands comprising this belt are chiefly low-lying plains, situated so far south that even the winters are warm, whilst the summers are hot. They receive rain, more in summer than in winter, from the damp winds blowing from the Gulf of Mexico. As in the Atlantic coast plains (see Fig. 106), the sandy belts are forested, conifers which yield hard timber being the commonest trees. On the low-lying, wet, coastal margins rice is the chief crop, but cotton predominates further inland. The climatic requirements for the successful cultivation of cotton are a long summer free from frost, for the plant is very sensitive to frost, and a moderate, but not excessive, rainfall. Too much moisture leads to an increased crop, but of poorer quality, whilst insufficient moisture causes a diminished yield. Sugar is also grown, being especially important in the Mississippi delta and flood plains.

The large negro population in the states of this belt is accounted for by the fact that the climate and work are unsuited to white labourers, and that in order to supply the need, slaves were introduced.

New Orleans is the chief cotton port. Its position on the Mississippi, which is a great highway of commerce, gives it water communication with towns so far apart from each other as *Pittsburg*, *Minneapolis* and *Kansas City*, so that it is the southern gateway to the greater portion of the basin, whilst railways from the coastal plains, the Appalachian valley, the Mississippi basin and the west coast converge upon it. (See Fig. 106.)

Galveston, *Mobile*, *Savannah* and *Charleston* are all engaged in exporting cotton and timber. The presence

of a coal and iron field on the western flanks of the Alleghany plateau has been mentioned, and we have just learned that west, south and east of the southern Appalachian system, cotton is grown. Most of the cotton is exported to the New England States, Lancashire and elsewhere, but the development of cotton manufacturing locally is taking place, and every year sees an increase in the number of mills. One difficulty is the obtaining of workpeople, for, although they are much more advanced than formerly, the negroes are not quite suitable for the skilled work required ; still, even in this respect, improvements in education are making changes. Notice the town of *Birmingham* at the southern end of the Alleghany plateau. In 1880 it was a small township, but it is now the centre of a coal and iron region only second in importance to that of the Pittsburg area. Besides iron and steel goods it manufactures cotton.

The State of Florida deserves a little special mention. In the south there are a large number of lakes occupying hollows where the limestone, of which this part of Florida is built, has been dissolved. *The Everglades* is an almost impenetrable region on account of the dense vegetation and swamps. Notice the town of *Key West*, situated on one of the long line of coral islands stretching westwards from southern Florida. Besides being an important naval station, it has many tobacco factories owing to its nearness to Havana in Cuba. It is reached by a railway which crosses long bridges in making its way from island to island. As it is so far south, Florida has a high temperature, and so tropical and sub-tropical fruits, such as pineapples, coco-nuts, bananas, oranges and lemons can be grown, and these form important exports. Even in winter the temperature is warm, and many towns are engaged in catering for visitors from the colder northern states, whilst in the hot summer many of the richer inhabitants of Florida travel north. *Jacksonville*, the largest town in the state, is a noted winter holiday resort.

The High Western Plains.—Fig. 106 shows that the western tributaries of the Mississippi (Missouri, Platte,

Arkansas, etc.) flow across the highest portion of the central plains, which rise gradually as the Rockies are approached. We have seen that west of Longitude 100° W. the rainfall is generally too little for agriculture, except where irrigation is possible. These vast High Plains, treeless except near rivers or sources of water, are dry grasslands, and therefore the natural occupation is stock-rearing. The cattle can remain out of doors all the year round, for not much snow falls, whilst owing to the dryness, the grass is turned into hay by the sun without being cut.

The chief ranching centres are *Kansas City* and *Omaha*. Each of these towns is a great market centre for cattle, horses, sheep, hogs and grain, and as they are nearer the ranching area they have some advantage over Chicago as canning and packing centres. Both are on the Missouri, near to junctions with important tributaries.

Helena, Cheyenne, Pueblo, Santa Fé and El Paso all control passes or easy routes across the Rockies along which the railways can pass on their way westwards. (See Fig. 106.)

There are some parts of the High Plains which are unsuitable for cattle-rearing. *The Bad Lands* of South Dakota were formerly the beds of old lakes in which were deposited layers of sandstone, limestone, clay, etc. The area suffers very much from lack of water, but when rain does fall, every little temporary stream is at work wearing out a steep gully. One writer says of the Bad Lands that their name is expressive of the strangest, and in many respects the most repulsive, scenery in the world.

The Staked Plains of western Texas and eastern New Mexico, like the Bad Lands, lack rain. They owe their name to the fact that owing to the scarcity of water, travel routes were at first marked out by stakes. Underground sources of water have been found, and some parts have become good ranching country; but on the whole the Staked Plains have well been described as "an ocean of prairie desert."

THE WESTERN HIGHLANDS.

This section of the United States occupies the broadest part of the Cordilleran system of western North America. Physically it falls into four units: (i) The Basin of the Columbia-Snake, (ii) The Great Inland Basin, (iii) The Colorado Plateau and (iv) The Valley of California (see Fig. 107).

THE BASIN OF THE COLUMBIA-SNAKE.

The Columbia may be compared with the Fraser, for it flows through an area rich in timber; it is famous for its salmon fisheries, and its lower valley is a great agricultural region noted for wheat and fruit.

The Snake flows across a lava plateau in which it has cut a cañon some 4,000 feet deep, and has not yet reached the bottom of the lava. Unlike the Columbia Valley, which receives rain all the year round from the westerly winds, the area drained by the Snake has insufficient rain, for it is to the lee of the Cascade and Sierra Nevada Mountains. Large areas are semi-desert, and only in the more exposed, and therefore wetter, parts is agriculture carried on.

The largest city and port is *Portland* (Ore.), which is 120 miles from the mouth of the Columbia. Farther north, on Puget Sound, are *Seattle* and *Tacoma*. All three trade in wheat, lumber, wool, canned fruits and salmon.

Yellowstone Park.—This famous park, which is not quite as large as Yorkshire, lies in the Rocky Mountains in the north-west corner of Wyoming. It is on the watershed, or Great Divide, between rivers flowing westwards and those flowing to the Mississippi, and is at an elevation of about 7,000 feet above sea-level.

The Park contains, amongst other wonderful things, hot springs, boiling mud springs of very many colours, geysers, cañons, lava flows and extinct volcanoes, besides beautiful lakes, waterfalls and magnificent forests. The whole area has been set aside as a National Park so as

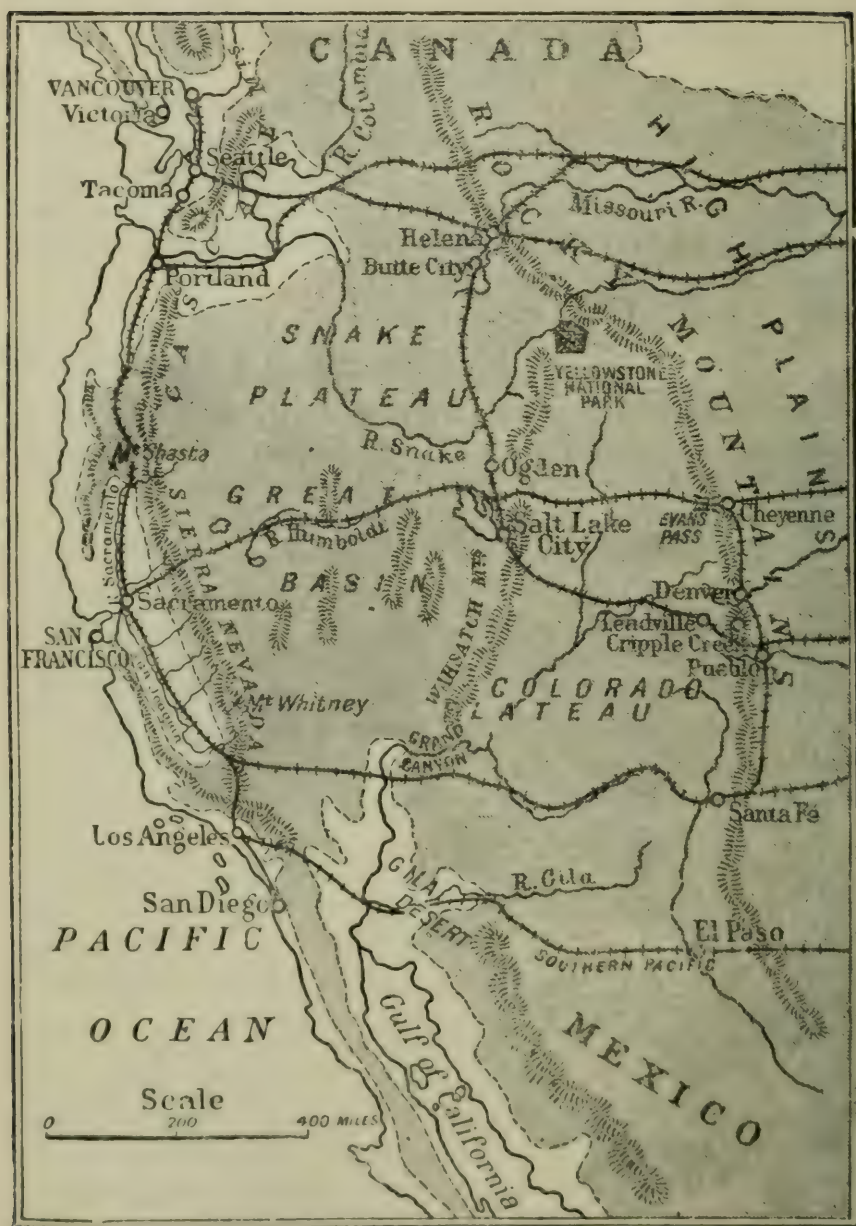


FIG. 107.—Map of the Western States. The shaded areas are over 1,500 feet in elevation.

to preserve for ever one of the most wonderful regions in the world. The laws also protects animals and birds.

THE GREAT BASIN.

This plateau region is bounded on the west by the Sierra Nevadas and on the east by the Wahsatch Mountains, and is crossed by many north and south ridges, many of which have been produced by the fracturing and tilting of the rocks comprising the plateau (see Fig. 108). Like the Snake plateau, the Great Basin lacks rainfall, and for the same reasons.

There is not *one* large basin of inland or continental drainage, but many, for there are several rivers which drain the basins between the parallel chains and find their mouths in salt lakes of varying size. The largest river, the Humboldt, flows east and west for about 500 miles, and ends in a lake of the same name. The largest



FIG. 108.—This diagram shows strata which have been faulted and tilted.

lake, Great Salt Lake, is only a remnant of a former lake of much greater size, for on the sides of the surrounding mountains there are beach lines and wave-cut caves, indicating its former extent at a time when the rainfall exceeded its present amount. The ancient lake, known as Lake Bonneville, contained fresh water, but continued evaporation made the lake more and more salt, especially when it ceased to have any outlet, for there were then no means of getting rid of the salt. Large areas which once were the bed of the lake are encrusted with salt, and the Great Salt Lake itself contains so much dissolved mineral matter, that a man cannot sink in its waters.

Despite the prevailing drought, the district surrounding *Salt Lake City*, has, by careful irrigation, been turned into rich farming land. In this city a majority of the people are Mormons, a peculiar sect founded in 1830,

and it is they who have reclaimed the former wastes. The discovery of minerals has brought a mining population, and this, together with the making of the railways, has resulted in the settlement of large numbers of non-Mormons.

THE COLORADO PLATEAU.

This region, like the Great Basin and the Snake plateau is arid, large areas being true desert.

The rivers, which rise in the Rockies, and thus are fed

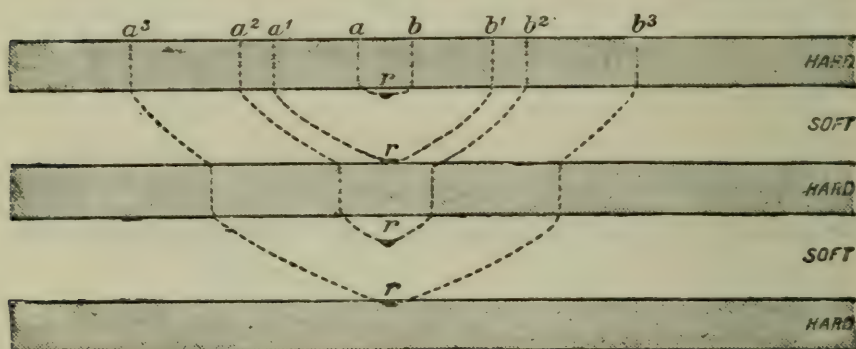


FIG. 109.—This diagram shows successive sections of a valley made by a river which flows over an area of horizontal strata arranged in alternate layers of relatively hard and soft rocks.

by snow and rain, have cut deep cañons in the plateau, of which the most notable is that of the Colorado River. In the Grand Cañon this river, for over 200 miles, flows at the bottom of a chasm over 6,000 feet in depth, and varying in breadth from 10 to 12 miles. What irregularity of outline the sides of this valley or cañon possess, is due to the fact that some layers of rock are softer than others, so that they form gentle slopes, whilst the harder rocks stand out as steep slopes or cliffs (Fig. 109). One of the most wonderful sights in this cañon is the colouring of the rocks; the grey of the limestone, the red of the sandstone, and the darker colours of the measures below the sedimentary rocks. Needless to say, such a river valley makes communi-

cation between opposite sides very difficult indeed, for no railway can cross. In time the river and its tributaries will divide the plateau into a number of tabular blocks of mountains, whose separating valleys will become wider and wider, and whose surface will be lowered, whilst eventually the whole area will be reduced to a peneplain—unless the forces of nature are rejuvenated by a further uplift.

There are many flat-topped, steep-sided mountains in the Colorado basin, and they are known as *mesas*, which is a Spanish word meaning table. The smaller, flat-topped mountains, which are often detached portions of mesas, are called *buttes*. Mesas and buttes form excellent sites for the Pueblo Indians to build their dwellings upon.

In its lower course, the Colorado flows across true desert lands, for here the prevailing winds are the Trades. To the west of the river is the Mohave Desert in California, and to the east the Gila Desert in Arizona.

THE VALLEY OF CALIFORNIA.

The state of California includes the Mohave Desert and a small area of the Great Basin, but the most important portion is the plain between the Coast Range and the Sierra Nevada, drained by the Sacramento and San Joaquin Rivers. This flat plain has been built up by sediment brought from the neighbouring mountains by rivers.

The climate resembles that of the countries bordering the Mediterranean Sea, for the summers are dry and most rain falls in winter, but the coastal lands are much cooler in summer than the Californian valley, where great heat is experienced. The rainfall is also less in the sheltered plains, and in the drier areas it is necessary for irrigation to be practised. Mediterranean fruits (vines, oranges, lemons, figs, etc.) have been introduced with great success, and fruit growing, drying, packing and canning are important occupations. Large quantities of wheat are also grown.

San Francisco, the largest city on the western coast of the Americas, has a magnificent situation, as Fig. 110 shows. From the mouth of the Columbia to San Diego, near the Mexican frontier, there is no other good harbour, so that the port has no immediate rivals. The produce

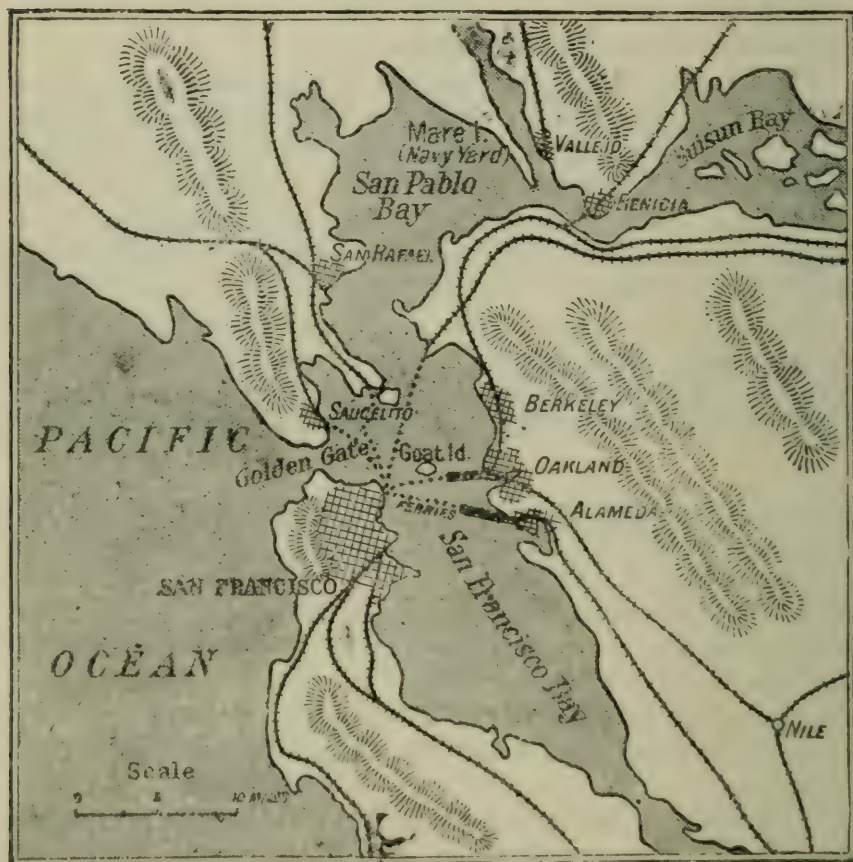


FIG. 110.—San Francisco and its environs.

of the Californian valley finds an outlet through San Francisco, and has given the city many allied industries, such as flour milling, brewing, woollen manufacturing, etc. The building of steel ships, both war and merchant, is also a very important industry. A disadvantage from which San Francisco suffers is the lack of coal, but, against this, California is the greatest oil-producing state

in the country. Railways from the east converge upon the city, whilst its ships sail to all parts of western America, eastern Asia and Australasia. The making of the Panama Canal has made the port more important than ever. (See p. 418.)

Los Angeles, the second city in California, has grown very rapidly owing to the valuable deposits of oil which have been discovered there, but it is also the centre of a district noted for fruit and wheat. *Sacramento*, the state capital, is on the river of the same name.

MINING IN THE WESTERN STATES.

It was mining which in 1848 attracted the first settlers to the western states, and the industry has so grown that to-day they form one of the most important gold, copper, silver and lead mining regions in the world. The chief mining centres are in the Sierra Nevadas and the Rockies, and in most places the above minerals are found together, but naturally in varying quantities. The most important copper mines in the world are at *Butte City*, in Montana; gold is mined at *Helena*, Montana, and *Cripple Creek*, Colorado, and lead at *Leadville*, Colorado. *Denver* is the largest of all the mining centres, although it is more important as a centre for the surrounding mining towns than for its own mining, which is not very great. The ores are smelted there, and mining machinery is manufactured. The city is also the centre of a rich stock-rearing and agricultural area, which is supplied with water from the South Platte by means of irrigation canals.

ALASKA.

Alaska consists of the northern portion of the Western Highlands of North America. The west coast mountains contain the highest peaks in the continent, and owing to the high latitudes there are innumerable glaciers, very many reaching down to the sea. The Yukon,

which is over 2,000 miles in length, runs through the centre, and has its mouth, a great delta, in Bering Strait. It is navigable for boats of shallow draught from June to October, and in winter time, when frozen, it makes a good sledge route into the interior. In 1867, when the United States bought Alaska from Russia for about one and a half million pounds, there were many complaints that worthless country had been obtained. In 1915, the Alaskan exports to the United States exceeded £16,000,000 in value, whilst the value of the imports exceeded £5,000,000!

The map shows that the position of the boundary between Alaska and Canada gives to the former a panhandle-like stretch of coastline whose hinterland is the Canadian territory of Yukon. This coast has very rich fisheries, especially of salmon. Whaling and sealing also employ very many men. The Pribilof Islands in Bering Sea are the chief centre for fur seals.

Alaska has rich deposits of gold, silver, copper and other minerals. The most important mining areas are on the Alaskan and Yukon boundary, and at *Nome* and other places along the west coast. In 1897 gold was found in the gravel of tributaries of the Klondike, a feeder of the Yukon, and the gold rush which took place was one of the most remarkable events of recent years. The best way of reaching the Klondike mining area is by a railway from Skagway, which is carried over the White Pass to the navigation limit on the Lewes, one of the headstreams of the Yukon. From this point river steamers run to the mining area.

There are also extensive forests, so that lumbering may be important in the future.

In 1891 sixteen reindeer were introduced into Alaska from across the Bering Strait. There have been a few importations since, but the number now exceeds 40,000, of which about 25,000 are owned by natives. The country is at present very sparsely peopled, for there are only 39,000 whites and 27,000 coloured people, the latter being largely Eskimos and Indians. The tendency is for the whites to increase and the coloured people to

decrease. *Juneau* (4,000) is the largest town and the seat of government. *Nome* is the chief city and port of Alaska proper.

THE UNITED STATES: CONCLUSION.

After their conquest of Mexico the Spaniards spread northwards with comparative ease, and took possession of what is now the south-west portion of the United States. The English settled on the east coast, whilst the French occupied the central plains, having reached them along the easy route of the St. Lawrence valley. The English and French colonies inevitably came into conflict, and the struggle for supremacy was finally settled during the Seven Years' War. The Treaty which concluded that war not only gave Canada to England, but also the French colonies east of the Mississippi, and the Spanish possession of Florida. When, a few years later, the great struggle between the American colonies and the mother country ended in a victory for the colonists, Florida went back to Spain, so that the portion of the present United States that remained for the colonists was all the land east of the Mississippi excepting Florida. (See Fig. III.)

In 1803 the remainder of the French possession of Louisiana was purchased for £2,500,000, and sixteen years later Spain sold Florida for £1,000,000. In 1821 Mexico became independent of Spain. A large number of settlers from the eastern states had made their homes in Texas, and that state, which was part of Mexico, was annexed in 1845. Trouble arose about this and the determination of the boundary, and the outcome of the war that followed was that Mexico ceded the remaining portion of what had been Spanish territory. This occurred in 1848, and several years later a smaller portion south of the ceded territory was added by purchase from Mexico, the price paid being £2,000,000. There is still the north-west to account for. Claim was laid to this by both Canada and the United States,

and finally in 1848 the 49th parallel of latitude was agreed upon as the international boundary. It is notable that there are neither fortresses nor military works along this great length of boundary.

In 1916 the population of the United States was estimated at about 102 millions. That part of the country from the Mississippi to the Atlantic and north of the line of the Ohio River is the most densely peopled. The High Plains and the Western Highlands



FIG. III.—How the United States acquired her territory.

(except for the Valley of California and the lowlands of the lower Columbia) have very few people indeed—less than 10 per square mile. Florida, too, is sparsely peopled, whilst the rest of the country has from 30 to 50 per square mile.

About one-seventh of the inhabitants are foreign-born, a factor which is not always remembered by critics of the country. There are also over 10 millions of negroes, who are chiefly found in the southern cotton belt from Texas to North Carolina; and about 300,000 Indians, who live almost entirely in government reserva-

tions (*e.g.* Indian territory, north of Texas), where attempts are made to help them to live settled, peaceful lives. These two "native" problems, especially that of the negroes, are of great importance and of considerable concern to the government.

The United States is to-day the richest country in the world. Her vast territories produce a wide range of commodities, and provide a large surplus for export. Of all the countries which took part in the Great War, she has suffered least, and she now finds herself in a very strong commercial position. Let us hope she uses her great power and influence in these times of reconstruction for the betterment of the whole world.

MEXICO.

Physical Features.—The greater part of Mexico consists of a high plateau which in all its essential features is a continuation of that farther north. On the east and west this plateau is margined by the Eastern and Western Sierra Madre respectively, and to the south by a volcanic range of mountains containing such giant volcanoes as Orizaba (18,314 ft.) and Popocatepetl (17,880 ft.). The coastal plains are narrow, but broader in the east than the west. The Gulf of California is the southern portion of the great trough we have already noted (p. 364), whilst Lower California is a southern continuation of the Coast Range of the United States.

The physical continent of North America terminates at the Isthmus of Tehuantepec, but we must note that Mexico includes the low limestone plateau of Yucatan and the northern extremity of the highlands of Central America.

Climate and Products.—The southern half of the country lies within the tropics, and no part is far removed therefrom. The prevailing winds are the N.E. Trades, which bring rain to the east coast at all seasons. But the northerly summer migration of the

sun gives the plateau a marked low pressure area in summer, so that ocean winds from both east and west at that season bring moisture to the plateau. All over the country most rain falls in summer, and in some parts in no other season, except in very small quantities. Indeed, the climate is of the monsoon type and bears many resemblances to that of India. The distribution of temperature varies very much with altitude, so that we nearly have three well-marked climatic zones or belts, (1) the *Tierra Caliente*, or Hot Lands, (2) the *Tierra Templada*, or Temperate Lands, and (3) the *Tierra Fria*, or Cool Lands. The same belts are found throughout Central America and north-western South America.

The Tierra Caliente comprises the coastal plains, often very unhealthy, and the slopes of the mountains below 3,000 feet. The wetter parts are densely clothed with tropical forests, whilst fruits, such as bananas and pineapples, grow wild. The lower lands are also noted for the cultivation of cotton, rice, sugar, and cacao. On the slopes of the mountains there are plantations of maize, tobacco, and coffee.

The Tierra Templada is from 3,000 feet to about 7,000 feet, and includes a considerable portion of the plateau. The climate is one of perpetual spring, but not, of course, an English spring. Wheat, corn, beans, and temperate fruits can be grown where irrigation is practised, as in the district round Mexico City, which in this respect may be compared to Salt Lake City. On the plateau the cactus is very common, and often grows to considerable dimensions. One species, known as the *agave*, is cultivated for its milky juice, which is made into *pulque*, the commonest drink in Mexico. The thick leaves, like those of another similar plant, have a fibre which is a rival of jute. This fibre is known as *henequen*, or sisal hemp, and forms the chief product of Yucatan. There are plateau areas where irrigation cannot be practised, but which are nevertheless suitable for the rearing of cattle, horses, mules, sheep, and goats; but, owing to the very slight rainfall, quite half

of the whole is of no value even for pastoral occupations, whilst the north-west is true desert.

The Tierra Fria is above 7,000 feet, and contains splendid forests of pines and firs.

Mining.—One of the most important occupations in Mexico is mining, for the country is exceedingly rich in minerals. Silver is mined in nearly every state, but particularly at Guadalajara, Zacatecas and San Luis Potosi. Copper, gold, lead, iron, coal, and petroleum



FIG. 112.—Map of Mexico. Areas over 1,200 feet are shaded.

are also important mineral products. Owing to the great increase in the use of petroleum, the Mexican supplies have become very important, and the production has increased enormously. The chief deposits are in the neighbourhood of Tampico.

Routes and Chief Cities.—The main railway runs from El Paso, a United States frontier town on the Rio Grande, southwards through Zacatecas to Mexico City. Its connections are shown in Fig. 112. The capital is also joined by railway to its port, Vera Cruz, as well

as to the chief ports on the west coast. The low Isthmus of Tehuantepec is crossed by a railway largely used for transporting goods from Pacific to Atlantic steamers.

Mexico City is situated in the south of the central plateau, at an elevation of about 7,500 feet above sea-level. This part of the plateau consists of great sheets of lava (*cf.* the basin of the Snake, p. 403), hence the remarkable fertility wherever irrigation is practised. It is the most densely populated part of the country, as well as the chief agricultural area. The city itself is very much shut in by mountains, the giant volcanoes to the south of the city especially standing out in bold relief. *Pueblo*, south-east of Mexico City, is situated near to an ancient Aztec town, or pueblo, and is an industrial centre. On the east coast, the chief ports are *Tampico* and *Vera Cruz*. Both are situated on the low-lying, unhealthy, coastal plains, and have poor harbours, upon which large sums of money have been spent in constructing breakwaters. *Mérida* and *Campêche*, in Yucatan, export henequen. On the west coast *Mazatlan* and *Acapulco* have the best harbours.

Mexico obtained her independence from Spain in 1821. At present she is a republic whose government is modelled on the lines of that of the United States, but she is not by any means so peaceful or as well governed as her powerful neighbour. Indeed the country is in a very backward state. Its agriculture is generally carried on by the most primitive methods, whilst the mining industry is largely in the hands of foreigners. Perhaps these conditions are not to be wondered at in a country where 38 per cent. of the people are Indians, 43 per cent. are of mixed race, and only 19 per cent. are whites. The houses of the poor people are often wretched hovels. They are usually built of sun-dried clay and straw bricks, or adobes, and very often a house contains only one room. In the large cities, however, there are many splendid buildings, especially cathedrals, most of which were built by the Spaniards.

CENTRAL AMERICA AND THE WEST INDIES. CENTRAL AMERICA.

Physical Features.—Central America extends from the Isthmus of Tehuantepec to the Isthmus of Panama, and occupies an exceedingly important position between the Atlantic and Pacific Oceans. It is itself an isthmus joining North and South America, but its connection



FIG. 113. —This diagram illustrates the former connection which existed between the Greater Antilles and Central America.

with these continents was made in recent geological times.

In the large West Indian island of Hispaniola three distinct mountain ranges can be traced. The northern range is connected by submarine ridges through the highlands of north-west Cuba to the peninsula of Yucatan. The central range is represented in Cuba by the Sierra Maestra, which in turn is connected with British Honduras by a submarine ridge, above which stands the island of Grand Cayman. The southern ridge can be

traced through Jamaica to Honduras. In the island of Porto Rico the three ranges of Hispaniola form one highland mass (see Fig. 113). Thus it will be seen that Central America is very intimately connected with the Greater Antilles. Indeed, Central America and the West Indies are remnants of an ancient continent, which formerly extended much farther west than at present, and farther east than the existing West Indies. These islands have been separated from Central America by subsidences which allowed the waters of the Atlantic Ocean to form the Caribbean Sea.

To the west of Central America there are highlands close to the west coast and parallel with it. These are volcanic, and contain peaks nearly three miles high. To the east of the volcanic belt and between the Tehuantepec and Guatemala narrowings, the low limestone plateau of Yucatan points northwards. Between the narrowing in Guatemala and that in southern Nicaragua are ranges which run east and west, making the Isthmus very broad along the boundary between Honduras and Nicaragua. There is a further narrowing at the Isthmus of Panama. These narrowing points are of considerable importance to trade. A railway crosses the Isthmus of Tehuantepec (Fig. 112); and it is interesting to note that it is cheaper to send certain goods from New York to San Francisco by steamer, rail and steamer, despite the charges at the isthmus for unloading and reloading, than it is to send them on the transcontinental railways. Although the Guatemala narrowing is half as wide again, and is a much more difficult barrier to cross, it is crossed by two railway lines (Fig. 113). The narrowing in southern Nicaragua is about 150 miles across, and it was once proposed to utilize it for a canal, making use of the river San Juan and of Lake Nicaragua.

The Panama Canal.—The fourth narrowing is at the Isthmus of Panama, where the famous canal from Colon to Panama is situated. Here it is under forty miles from the Atlantic to the Pacific. The chief construction difficulty was the cutting made in the saddle at

Culebra Hill. Great quantities of earth constantly slid into the cutting and hindered the work considerably. Vessels ascend by three locks near to Colon and descend by three locks at the Pacific end, the bottom of the canal between the locks being forty feet above sea-level. Notice the artificial Gatun Lake, which has been made by placing a dam across the River Chagres.

A map of the world will show that the canal will shorten considerably steamship routes from New York, and the other eastern and gulf ports of North America, to the chief ports of western North and South America. The journey between New York and San Francisco will be shortened by nearly 8,500 miles, and between Liver-



FIG. 114.—Map of the Panama Canal. Water surfaces are not shaded.

pool and West European ports and San Francisco by 6,000 miles. The distances between North American Atlantic and Gulf ports and Australasia, China, and Japan will also be less via the Panama Canal than by the shortest possible alternative route. It is not likely that the Panama Canal will take from the Suez Canal much of the trade between European ports and eastern Asia and Australasia, for the present route is shorter; but it is worth while noting that it will give New York and the manufacturing New England States a much shorter journey to Japan and Australia (not to China) than that from the chief West European ports via the Suez to these places.

Climate and Vegetation.—The whole of Central

America lies between the equator and the Tropic of Cancer, so that its prevailing wind is the N.E. Trade. From this it follows that the temperature will be high and the seasonal range not marked, except in elevated areas, whilst more rain will fall on the east coast, or windward side, than on the west coast, or leeward side. Moreover, most rain falls in summer when the sun is overhead north of the equator.

On the eastern plains, owing to the heat and rains, there are forests and jungles, the coastlands being malarial and very unsuitable at present for cultivation and occupation by man. The majority of the inhabitants live either on the high plateaus where grasslands are found and pastoral occupations are followed, or on the drier west coast. In the *Tierra Caliente* the chief products of the forests are rubber and such valuable woods as mahogany and logwood, whilst tropical fruits such as bananas and pineapples, and plantation products such as cacao, are cultivated and exported. The *Tierra Templada* is forested on the wetter east, whilst on the west coast it is mainly a grassland with scattered patches of trees. Pastoral occupations are carried on, and the chief cultivated product, and the most important export, is coffee. The *Tierra Fria* contains extensive areas suitable for pastoral pursuits and for the growing of grain.

Political Partition.—There are six independent republics and a British possession (British Honduras) in this small area. Guatemala is commercially the most important of the republics, selling more produce to foreign countries and buying from them more than any other state. Salvador, the smallest, is the most densely peopled. In this connection notice its position. The inhabitants of Central America are mainly Indians, Spaniards, or half-breeds, and owing to the very backward condition of most of the people, manufacturing is unimportant.

THE WEST INDIES.

From the physical point of view the West Indies may be considered in three groups: (i) The Greater Antilles, (ii) The Lesser Antilles, and (iii) the Bahamas.

The Greater Antilles.—This name is given to the group comprising the large islands of Cuba, Hispaniola, Porto Rico, and Jamaica. We have already discussed their former connection with Central America (p. 417).

The Lesser Antilles.—These islands are the tops of a submerged ridge stretching from Porto Rico to Trinidad. They may be classified in two ways. The northern islands are known as the Leeward Islands, and the southern ones as the Windward Islands. A better classification is according to their formation. A map shows that there are two chains of islands—an eastern, and a western. The eastern islands are made of limestone, whilst those to the west are of volcanic origin. Observe the peculiar outline of the French island Guadeloupe. Its eastern half is limestone and its western half volcanic. Violent eruptions are not uncommon in the volcanic islands, the most recent being the great eruptions of Mont Pelé (Martinique), and La Souffrière (St. Vincent), which took place in 1902.

The Bahamas.—This group of coral islands—there are about 3,000—stands on a submarine platform which is a continuation of Florida. Over this platform sweep the warm water of the Gulf Stream, hence the presence of coral polyps outside the tropics.

Climate and Products.—Owing to their nearness to the equator, and to their insular character, the mean temperature is high and equable. The seasons are more distinguished by differences of rainfall, considerably more rain falling in summer than in winter. The prevailing winds are the N.E. Trades, and the windward slopes of all the islands receive most rain.

As most of the islands are mountainous, the type of natural vegetation depends upon altitude. Forests are plentiful, especially on the wetter windward slopes, and

in the largest islands very extensive. Cabinet and dye woods, and tropical fruits (bananas, coco-nuts, and pine-apples), are all important. One of the most interesting trees found in the West Indies, especially in Cuba, is the royal palm. All parts of the tree—trunk, leaves, fibres, and seeds—are of value to the inhabitants. Sugar, cacao, coffee, and tobacco are cultivated in most of the islands. Indeed, every temperate and tropical crop can be produced. Sugar is the most important product, although since the increased production of sugar-beet in Germany, Holland, Belgium, and Northern France, the trade with Europe has very largely declined. In Trinidad there is a great pitch lake from which asphalt, an almost solid substance formed when petroleum deposits are exposed to the air, is obtained. In the Bahamas henequen and pineapples are special products, whilst sponge-fishing and turtle-catching also find occupations for many people.

Havana, in Cuba, is noted for its tobacco industry. *Kingston*, in Jamaica, is one of the chief West Indian ports. It occupies a splendid position with regard to the Panama Canal and its approaches, especially the Windward Pass between Cuba and Hispaniola.

Formerly all the West Indies belonged to Spain, by virtue of discovery, but to-day not one island is Spanish. Jamaica was the first to be lost, for it became a British possession in the days of the Commonwealth, and it has remained so ever since. The Bahamas, and most of the Lesser Antilles are also British, but some of the latter are owned by France, Holland, or the United States. As a result of the war between the United States and Spain in 1898, Porto Rico became a possession of the former country, and Cuba an independent republic. Hispaniola consists of two independent negro republics, Haiti and San Domingo, the former showing the influence of French occupation in so far as it is French-speaking, whilst the latter is Spanish-speaking. The island is in a very backward condition, and altogether it cannot be claimed that the experiment of native-controlled republics has been a success, for the inhabi-

tants are too indolent to take advantage of the island's natural fertility.

THE BERMUDAS.

Although not part of the West Indies, this is the most appropriate place to mention the group of small coral islands some 600 miles east of North Carolina, whose foundations are laid on a volcanic cone rising from the bed of the ocean. It is interesting to notice that they are among the very few coral islands outside the tropics. Why is this?

The Bermudas are noted for their splendid climate, for the winter is never cold, neither is the summer heat oppressive, and this accounts for their popularity as a holiday resort for Americans.

The islands occupy a position of considerable strategic value, hence they have become an important naval dockyard and victualling establishment on the North American and West Indies station. The inhabitants, who are largely negroes, raise early vegetables, especially onions and potatoes, which find a ready sale in the American markets. There are also extensive areas devoted to the cultivation of the Easter lily. *Hamilton*, the largest town, has a population of about 3,000.

EXERCISES.

1. How do we know that Great Ice Sheets once covered the north of North America?

2. Describe, and account for, the leading features of the coast-lines of British Columbia, South Carolina, and New England.

3. Draw, as accurately as you can, three sections across North America (including one from north to south), and write a brief description of each.

4. Describe the seasonal distribution of rainfall in North America.

5. Explain each of the following terms, and give North American examples of each: penepplain, continental shelf, area of continental drainage, delta, fall-line.

6. Draw sketch-maps to show the importance of the site of each of the following cities: Winnipeg, New Orleans, Buffalo, Calgary, Pittsburg, Boston, Philadelphia. (See Figs. 71 and 88.)

7. "Canada is the America of opportunity, and the United States the America of achievement." Discuss this fully.

8. How far has Standard Time been put into operation in North America? When it is noon in New York, what time is it at San Francisco? When it is 2.30 a.m. Monday, at Montreal, what time is it in Vancouver (B.C.)?

9. In which parts of North America are each of the following produced on a large scale: cotton, wheat, timber, fish, dairy produce? What geographical factors have made the areas you mention suitable for the large-scale production of the articles you mention?

10. Write an essay on the problem of the coloured races of North America (especially Indians, Eskimos, Chinese, and Negroes).

11. At what points along a river are important cities likely to be found? Give examples from the basin of the Mississippi.

12. Why is it that New England is important for manufacturing, despite the lack of local supplies of raw materials, and also of coal and iron?

13. Write an account of the Appalachians under the following headings: (1) General physical features, (2) Differences between north and south, (3) The mountains as barrier to human intercourse.

14. Draw a map of the Great Lakes and their tributary canal connections, showing their importance as great water routes.

15. What are the chief articles of trade between (a) Canada and the United Kingdom, (b) Canada and the United States, (c) The United States and the United Kingdom? Add what explanation you can.

16. Describe the difficulties which had to be overcome before the Panama Canal could be completed. Which countries will benefit most by the construction of the canal?

17. Account for the name West Indies. Where are the East Indies? Compare their geographical position, and also their chief products of economic importance.

18. Mexico is to-day the most backward country in North America, although at the time of the discovery of the continent its inhabitants were the most progressive. Can you give reasons for this?

19. Halifax (N S) to Prince Rupert (B.C.).

Train leaves Halifax	.	.	8.10 a.m. Monday.
" arrives at Montreal	.	.	5.0 p.m. Tuesday.
" " " Winnipeg	.	.	8.45 p.m. Thursday.
" " " Saskatoon	.	.	11.25 a.m. Friday.
" " " Edmonton	.	.	11.25 p.m. Friday.
" " " Prince Rupert	.	.	7.45 p.m. Sunday.

Describe a journey by the train whose time-table is given above. In which parts of the journey would you prefer to travel in the observation car? Is there any part of the journey you would be

disappointed not to see owing to the time at which you would pass it? At what time of the year would you prefer to make this journey? Is the rate of travel per day about the same? What is the average distance covered per day? How does this compare with that of a fast liner plying between Liverpool and Halifax or Boston? In which part of the line would the construction per mile be most costly? In which the cheapest?

20. Give some account of the West Indies, Mexico and Central America as they were when the Spaniards conquered them in the 16th century.

21. On a map of North America mark in different ways the names which are of Indian, Spanish, English and French origin. Do you find that they group themselves in such a way that you can make any deduction as to the influence or work of each of these peoples on the development or colonisation of the continent?

22. Give North American examples of regions which to-day are regions of "privation," of "wandering," of "effort," and of "difficulty." Do you think they will change their character during the next 100 years?

PART VI

SOUTH AMERICA

RELIEF AND STRUCTURE.

SOUTH AMERICA stretches from 12° N. to 55° S. and has about four-fifths of its area within the tropics.

Compared with its great size, it has a short coastline, and this, of course, is due to the absence of peninsulas. It is nearly twice as large as Europe, but has only three-quarters the length of coast-line.

If physical maps of North and South America are compared, we find the following similarities between the two continents—

1. Both are broadest in the north and taper towards the south, and are roughly triangular in shape. Is this true of other large land masses?
2. The highest mountain masses are in the west of each continent. In both, these have strong structural resemblances. (Cf. Figs. 95 and 115.)
 - (b) In the east of each there are also highlands, and in each case these are lower and older than the western highlands.
 - (c) The centre of each is largely occupied by plains.
3. The direction of the main river drainage has certain resemblances.

The following contrasts will also be found—

1. South America has no river of any importance draining into the Pacific. North America has such

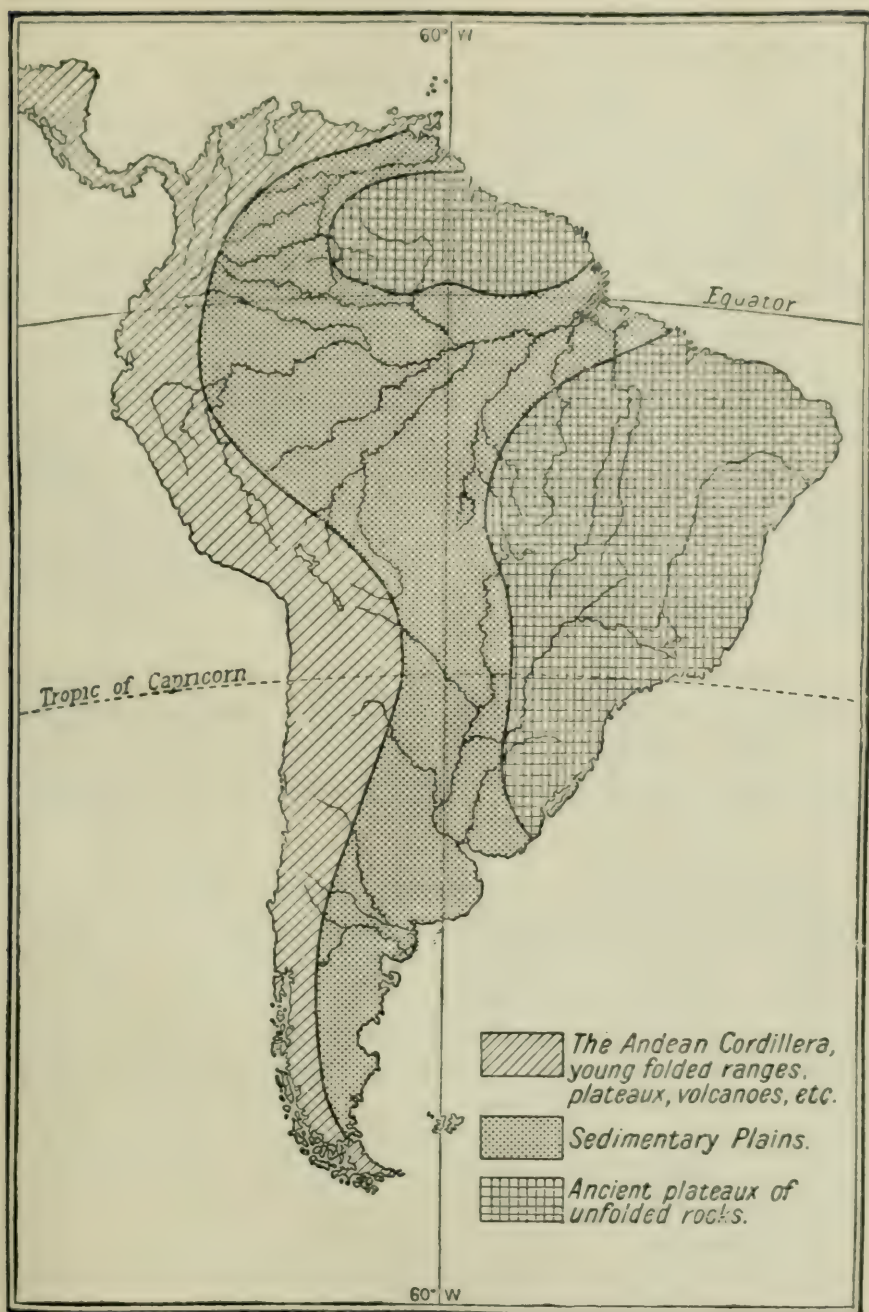


FIG. 115.—The chief structural divisions of South America.

large west-flowing rivers as the Fraser, Columbia, Sacramento and Colorado.

2. South America is broadest where it is hottest, whilst the opposite is true of the northern continent.

3. In South America there are no large openings like Hudson Bay, or long gulfs or peninsulas like those of Lower California.

4. Although the mean elevation of each continent is about 2,000 feet, a larger proportion of South America is below an elevation of 600 ft. than in North America.

5. South America has no area comparable with the old worn-down highland region around Hudson Bay.

6. The eastern highlands of South America consist of plateaus of unfolded rocks, whilst those of North America consist of ancient folded mountains which were denuded to a plateau, the subsequent uplift of which has produced the present appearance of the Appalachians.

The most prominent physical feature of South America is the great *Andean Cordillera*. The remaining highlands will fall under the two headings: the *Brazilian Highlands* and the *Guiana Highlands*. Between these three highland regions there are plains drained by great rivers.

The Andes.—Three ranges from the Caribbean Sea meet at the knot of Pasto and continue as two main chains, enclosing the high narrow plateau of Ecuador, which is about 8,000 feet high, although the peaks of the two main chains flanking the plateau are very much higher. (See Fig. 20.) There are many volcanoes here, the best known being Cotopaxi, which is over 19,000 feet in height, that is, nearly three and three-quarter miles, although Chimborazo, overlooking Quito, reaches almost four miles.

Southwards, in Peru, the Cordillera has three well-marked ranges, whilst the enclosed plateaus are broader. (Fig. 21.) It is here that the Amazon and many of its tributaries rise. Farther south, in the broad plateau of Bolivia, buttressed on the east and west by high moun-

tains, the system is at its widest. This plateau is about 12,000 feet above sea-level, and some of the high peaks are considerably over 20,000 feet—Sorata, one of the highest peaks in the continent, reaching almost 22,000 feet. On this plateau is Lake Titicaca, which has no outlet to the sea, and is, therefore, a centre of inland drainage like the Great Salt Lake of North America, and, like that lake, was at one time very much larger. South of the Brazilian plateau the Andes is one giant range, and it is here that we have the highest peak in the Americas, Mount Aconcagua, a great volcano some 23,000 feet high. Further southwards the Andes still contain snow-capped peaks and volcanoes, but are diminished in height.

The Lowlands.—The great lowlands of the basins of the Orinoco, the Amazon and the Plate were once inland seas. They have become plains owing to the deposition of sediment brought from the highlands by the rivers, but this process may have been assisted by an uplift of the old sea bed. Iquitos stands on the Amazon, near the eastern base of the Andes, 1,700 miles from the sea, but it is only about 300 feet above sea-level. Therefore the average fall from Iquitos to the sea is only about two inches per mile. This gives an idea of the flatness of these filled-up seas. In times of heavy rains or of flood the streams resemble long lakes rather than rivers.

The Brazilian and Guiana Highlands.—These highlands are separated from each other by the broad lowlands of the Amazon. They are plateaus which have been worn down very much indeed, and are intersected by deep gorges, through which flow the rivers. Long ago they formed part of an old continent which stretched right across the southern hemisphere (see Fig. 75). Great faultings and subsidences have formed the oceans which now separate them, whilst they themselves have suffered crustal movements and faultings which have produced masses of table-shaped block mountains. Notice that the Brazilian plateau has been so tilted that it has a long gradual slope to the Amazon, whilst steep scarp faces are presented to the Atlantic.

CLIMATE.

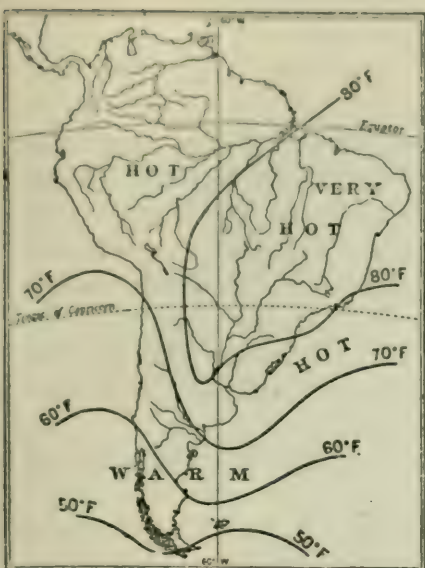
Fig. 116 gives sea-level isotherms for the coldest and warmest months. The region of greatest heat is farther south in January than in July. Notice, too, that South America is broadest where the temperature is greatest, *i. e.* in the north, so that the greater part of the continent is always hot.

The prevailing winds north of 30° S. are the north-east and south-east Trade winds, and south of 30° S. the prevailing winds are the westerlies.

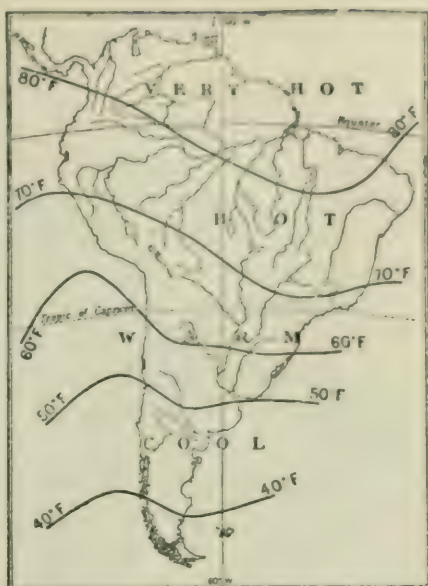
In studying the rainfall maps in Figs. 15, 16 and 116 it is important to notice that—

- (1) The north of South America, Central America and the West Indies get most rain in summer.
- (2) The equatorial regions get rain all the year round.
- (3) The Brazilian highlands and the Pampas lands get most rain in the southern summer.
- (4) Southern Chile, like all the highlands exposed to wet winds throughout the year, gets rain at all seasons.
- (5) Central Chile (the district containing Valparaiso and Santiago) gets most rain in winter.
- (6) There is (*a*) an almost rainless area north of the last area and extending as far northwards as the Gulf of Guayaquil; (*b*) another area of deficient rainfall stretching from the Bolivian plateau to the eastern slopes of the southern Andes.

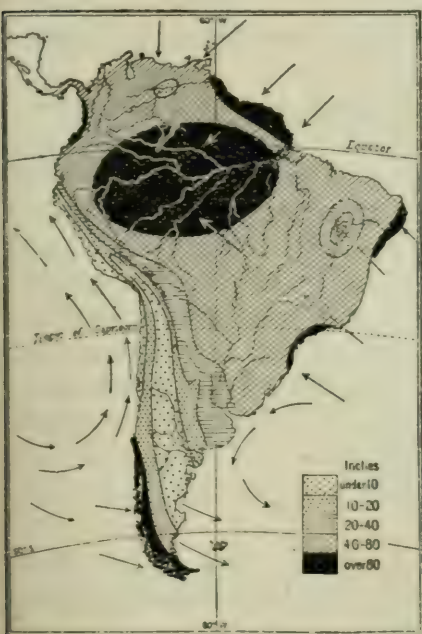
The causes underlying this distribution of the rainfall should be understood by now, so that we shall not dwell upon them. They are bound up with such factors as the seasonal migration of the belts of temperature and pressure, the character and direction of the prevailing winds, and the relief of the land.



Temperature map of South America for January.



Temperature map of South America for July.



The mean annual rainfall of South America.



The seasonal distribution of rain in South America.

NATURAL VEGETATION.

The Forests.—The Amazon lowlands have heat and considerable rain at all times of the year. These conditions give equatorial forests, known as *Selvas*, which here are denser than the Congo forests. The same kind of vegetation is also found along the north-east and north-west coasts, and along the east coast of Brazil. The eastern slopes of the Andes, in the area of the Trades, receive very great rainfall, and are heavily forested, but not in such luxuriant profusion as on the lowlands. These forests are known as the *Montana* (see Fig. 117).

There is another hot forest in the middle courses of the Paraguay and Parana rivers. This area is neither so hot nor so wet as the Amazon forest, and the vegetation may be described as sub-tropical. The most important tree is the yerba maté, or Paraguay tea. The leaves and twigs are dried and afterwards ground into a coarse powder. When infused, it gives a drink that is in great demand in all the countries of South America.

Temperate forests are found in central and southern Chile. The latter may be compared with those of British Columbia and Norway. The southern Andes are not very high, and their wet exposed windward slopes are densely forested with mixed deciduous and coniferous trees. The winter rain region of Central Chile has evergreen forests similar to those of California.

The Grasslands.—Tropical grasslands or savannahs are found in the summer rain regions to the north and south of the hot tropical forests. The northern areas are the *Llanos* of the Orinoco, and the Guiana highlands; the southern savannahs, or campos, are found on the Brazilian highlands.

Temperate grasslands are found in the Plate lowlands. West of the Parana they are known as Pampas lands, and bear much resemblance to the prairies of North America, the steppes of Russia, and the veld of South Africa.

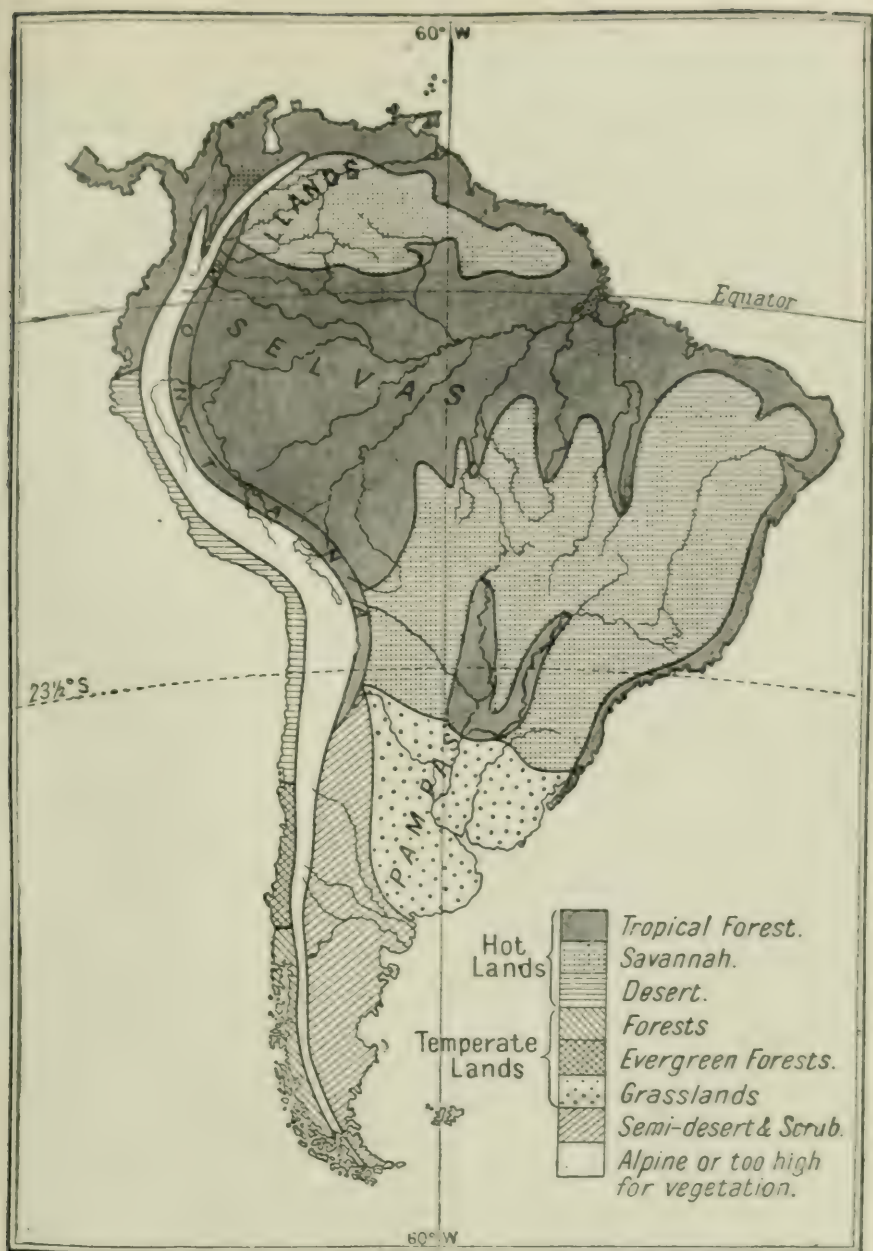


FIG. 117.—The distribution of natural vegetation in South America.

The Deserts and Semi-deserts.—On the west of the continent, in the latitude of the Trades, and lying to

the lee of the Andes, we find the hot desert of Northern Chile (Atacama) and Peru.

Between the Pampas lands and the Andes are dry plains comparable with those extending from Alberta to Texas. They have a rather extreme climate, and the rainfall is very small, so that agriculture is dependent upon irrigation, without which settled life is not possible.

The temperate Patagonian desert occupies the southern low plateau of Argentina, which lies to the lee of the Andes—here the eastern side—in the westerly wind belt. It is a shingle and sand desert, containing better watered tracts where grass is found. The belt near to the watershed is capable of considerable development.

Fig. 117 shows a long belt of mountain flora following the Andes. Much of the area so marked is too high for any vegetation, but it also includes many grass-covered areas on the high plateaus, where large numbers of cattle, sheep, llamas, alpacas and vicunas are reared. Local conditions of relief, slope, rainfall, soil, etc., cause mountainous regions to have many different types of vegetation.

THE REGIONS OF SOUTH AMERICA.

THE LOWLANDS OF THE AMAZON.

The basin of the Amazon is the largest in the world. The main stream is about 3,500 miles long, which is greater than the distance from Liverpool to New York. Two hundred and fifty miles from the mouth the river is 50 miles wide, in depth it often reaches 20 fathoms, whilst it is navigable from its mouth right to the base of the Andes. The chief tributary on the left bank is the Negro, and on the right bank the Madeiro. Fig. 118 shows that the Negro is joined to the Orinoco by the Cassiquiare River. This is an example of what is known as "river-capture" in an incomplete state. The stronger river will eventually take to itself the Cassiquiare and some of the waters of the weaker river. The watershed

is not yet defined. There is another case of river-capture not so far advanced—the case of the headstreams of the Tapajos and the Paraguay. In the wet season these rivers are actually united, the divide between them being very low.

With the physical and vegetation conditions of the Amazon basin, the constant heat and moisture, the dense, tangled mass of vegetation, we are already familiar. It

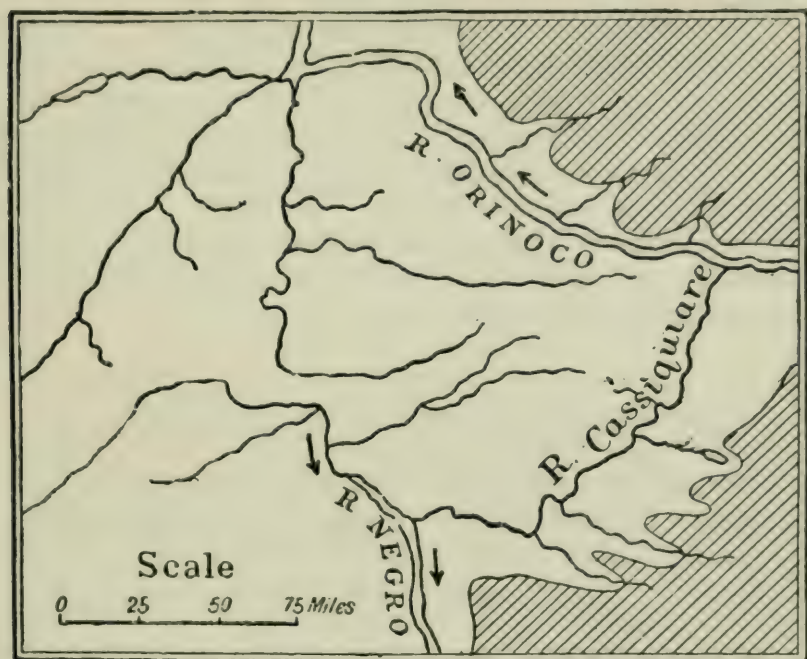


FIG. 118.—The River Cassiquiare. This map, on which the higher ground is shaded, shows that the Cassiquiare connects the Orinoco and the Negro.

is an equatorial forest, a *Region of Debilitation*, which, as you would expect, finds homes for very few people. Large areas are not developed, indeed considerable tracts have not even been explored. Most of the inhabitants are very backward, and exist mainly by fishing and turtle-catching; they live in wretched hovels made of twigs and mud, obtaining little vegetable food beyond bananas and wild fruits. Their boats are the hollowed-out trunks of trees. Some are now employed in collecting rubber which is by far the chief product of this area,

although it is not by any means the only important vegetable product. As the region becomes better known, and means of transport become cheaper, there are vast numbers of valuable timber trees which will find their way to the ports for exportation. When clearings have been made, almost every kind of tropical product will be cultivated, and it must be noted that there is no resting season, for crops can be grown all the year round.

The animals are mainly tree-dwellers. Reptiles, including great tree-snakes and alligators, abound. Monkeys are very numerous, and the forests often resound with their cries. Birds of many varieties are found, including brilliantly-coloured parrots, humming-birds, and birds of paradise. The larger animals, such as the elephant and hippopotamus, are entirely absent, except for the timid and inoffensive tapir, which may be said to represent the elephant.

THE LOWLANDS OF THE ORINOCO.

The Orinoco, which is 1,550 miles in length, rises in a range in the south of the Guiana highlands, and takes a great bend, skirting the highlands, its longer tributaries coming from the Andes. The lowlands of its middle and lower courses, except the delta, are tropical grasslands, or savannahs, but owing to the marked drought of the "winter," and the "flood" character of the rains of the wet season, cattle-rearing, the natural industry of savannahs, is not so important as might be expected. During the dry season large tracts of the llanos are little better than deserts. Moreover, these grasslands, and this is true of other South American grasslands, had neither cattle nor horses, nor any of the large domestic animals of similar regions in the old world, until they were introduced after the discovery of America. This partly accounts for the smaller native population compared with similar regions in Africa and Asia.

The delta is covered by tropical forests.

THE PLATE LOWLANDS.

The Paraguay, Parana and Uruguay Rivers form the great estuary known as the Plate River (Rio de la Plata). The upper courses of the Parana and Paraguay traverse an almost uninhabited and unknown forested country. In descending from the Brazilian highlands, the Parana and its tributaries form many waterfalls, which mark the limits of navigation.

In their lower courses these rivers cross the Pampas Lands; to the west are the drier areas, where the grasslands merge into semi-desert and scrub lands; to the north, in northern Argentina, western Paraguay and south-eastern Bolivia, there is the extensive area of forest and savannah land known as the Gran Chaco ("great hunting-ground").

Except in the Gran Chaco, which is little known, a great change has come over these lowlands in recent years, for a development has taken place which may be compared with that of the central lowlands of North America. The Pampas Lands are now no longer merely *Lands of Wandering*, for the nomadic Gauchos have been compelled either to follow a more settled mode of life or to retreat farther inland, and in their places we find enormous herds of cattle and sheep, whilst in the better watered lands of the Plate in the south, maize and wheat are produced in great quantities. (See Fig. 119.) Alfalfa is also very largely grown for fodder. Being deep-rooted, like most plants which thrive best in dry climates, it is suited to the climate of the pampas.

In the drier area to the lee of the Andes, the utilization of water from the streams for the irrigation of the land has been carried out with considerable success, especially at Mendoza, where fruit-growing is engaged in, and in the Tucuman area where sugar, rice, and tobacco are cultivated.

All the drier areas of the southern continents suffer from locusts, and the Plate lowlands are no exception. They do very great damage, especially to maize, for the

usual time at which they appear is just before the maize harvest, when the corn is soft and juicy. Efforts are



FIG. 119.—The chief products of South America.

made to destroy the pests before their wings appear, for after that stage has been passed, the planter can do little

to prevent their destructive work. Poultry and ostriches eat them ; but the eggs of the former are quite unsuitable for human food for some time after such a repast. It is believed that they breed in the Gran Chaco, and will probably decrease in numbers when that region is better known and extensive areas have been cleared. Try to get a good account of a flight of locusts. Their numbers are astonishing, whilst the damage they do in a very short time is tremendous.

The Plate lowlands have very little coal, and, except where the Parana and the rivers from the east leave the plateau, there are no falls, so that water power cannot be used. Therefore it is very likely that agriculture will always be the chief industry.

THE SHINGLE DESERT OF PATAGONIA.

We have learned that this is a shingle and sand desert, which contains some better watered tracts where grass is found. Sheep- and cattle-rearing, especially the former, are the chief occupations. The best lands are near the watershed, for the rest of the region suffers from dry winds, and sheep, guanacos, and rheas can only find sustenance on the scattered grass patches. The guanaco, like the llama, resembles the camel, whilst the rhea is the three-toed South American ostrich. Its feathers are not so valuable as those of the South African ostrich, which has been introduced into Argentina with considerable success. The skin of the guanaco is used by the native Indians in the making of tent-coverings and clothing.

The Falkland Islands, which lie on the Patagonian continental shelf, some 300 miles east of Magellan Strait, form a British Crown Colony. The climate is cold and wet, and strong winds blow nearly all the year. It is mainly owing to the force of these winds that there are no trees on the islands. All kinds of agriculture, except the growing of a few vegetables, are impossible, and the chief occupations are sheep-rearing

and whaling. Whaling is also carried on in South Georgia, a dependency of the Falklands. The principal harbour is at *Port Stanley*, whose chief importance is as a port of call for ships in need of water, food or fuel, or for the repairing of damage caused by the stormy winds of these seas. The population of the whole group is only 3,300.

THE BRAZILIAN HIGHLANDS.

This region is forested along the Atlantic coast, where it receives heavy rainfall, but in the interior the rainfall is less, and the plateau is a savannah land. The most important river is the São Francisco, which is 1,800 miles in length. It is interrupted by rapids, above which it is navigable for over 1,000 miles (Fig. 123).

The best agricultural lands are found in the better watered coastal belt, including the eastern margins of the plateau (see Fig. 119). Brazil is the chief *coffee*-producing country in the world, its total output forming 80 per cent. of the world's supply. The chief plantations are in the neighbourhood of *São Paulo*, where there are very rich volcanic soils, and a climate both warm and moist and free from frosts. Cacao is the chief plantation product of the forest clearings on the north coast.

The campos, or savannahs, of the highlands are little developed, and are only slightly peopled, although cattle-rearing is increasing in importance. Extensive areas are composed of granite and sandstone, the soil from which is often very infertile, whilst in many districts the severe drought of the dry season makes settlement very difficult. This and the former lack of large domestic animals account for the small native population and the present backward condition of much of this region. The most important cattle-rearing district is in the south-west, adjoining Uruguay. This part of Brazil approximates more to the wetter Pampas Lands, for the land is not so high, and the climatic conditions are favourable for the production of maize and other cereals.

Brazil has considerable mineral wealth, particularly of precious stones, but there is comparatively little mining. Precious stones, especially diamonds, are mined in the upper valley of the São Francisco.

THE GUIANA HIGHLANDS.

We have already learned that in its broad characteristics this region may be compared with the Brazilian highlands, from which it is separated by the Amazon valley. The Guiana highlands are very difficult of access, not only on account of their rugged nature and of the numerous steep scarp faces where the plateau has been faulted, but owing to the fact that the rivers, which would form the natural way of entry, are impeded by waterfalls, whilst their lower valleys are densely forested. The higher plateaus are suitable for cattle-rearing, but at present are little developed, in fact, a very large area of these highlands is little known, the best known districts being those where gold is mined.

The coastal plains are covered by tropical forests, in the clearings of which sugar and cacao are produced. Labourers have been introduced from Africa and India in such numbers that negroes and coolies far outnumber the white population.

THE NORTH ANDEAN OR COLOMBIAN REGION.

The northern Cordillera consists of three well-marked mountain chains, enclosing deep valleys occupied by the Magdalena, Cauca and Atrato. (See Fig. 120.) The three chains unite in the knot at Pasto, south of which is the high plateau of Ecuador, buttressed on the east and west by higher mountain chains. Although the valleys of these rivers are often swampy, they were the way by which, in the early days of Spanish occupation, the minerals from the mines on the plateau were brought

to the treasure-ships waiting along the north coast. They are the chief routes to-day.

The climate of this region very much resembles that of Central America, and the same well-marked belts are met with. *The Hot Lands* (Tierra Caliente) are the coastal lands and the lower river valleys and mountain

slopes. Here the natural vegetation consists of tropical forests. Cacao, sugar, tobacco, rice, and coffee (on the lower slopes of the mountains) are the cultivated products. *The Temperate Lands* (Tierra Templada) and *Cool Lands* (Tierra Fria) are higher, and are found in the fertile uplands and valleys. Their chief products are the cereals of the temperate zone such as maize and wheat, whilst on the higher plateaus stock-raising is the chief occupation. The limit of cultivated plants is about two miles

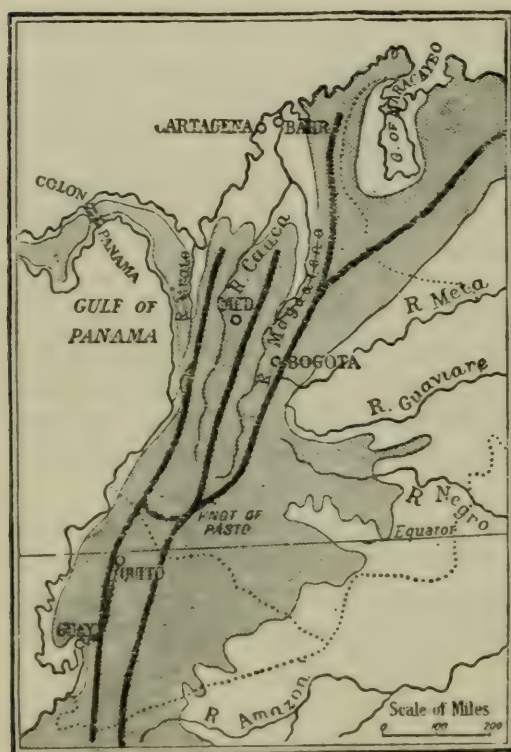


FIG. 120.—Map of the Colombian region. The thick lines show the direction of the main Andean ridges. The high ground is shaded.

beyond that the country is generally treeless, bleak and almost uninhabited. These higher areas are known as *Paramos*.

We have seen that on the eastern slopes of the Andes are the forests known as the *Montana*. In the clearings, cacao, cinchona, etc., are cultivated, and when this area is made more accessible by improved means

of communication, it will support a much larger population than it does at present.

The Colombian region has long been noted for its minerals, especially gold and silver, once shipped to Spain in large quantities. The chief gold-mines to-day are in the neighbourhood of Medellin, which is situated on the range between the Magdalena and Cauca valleys.

It is very probable that the making of the Panama Canal will be the means of giving a great impetus to the development of this region, as well as to Peru. The ports of north-west South America will be brought into much better communication with the east coast of North America and Western Europe than at present, and the products of this region are such as are interchangeable with those of the regions mentioned. That is, the Colombian countries require manufactured articles in exchange for the minerals, coffee, sugar, cacao, etc., which are needed by the eastern states of North America and the countries of Western Europe.

THE PERUVIAN AND BOLIVIAN PLATEAUS.

These plateaus occupy the Central Andes from the point where the Maranos, the headstream of the Amazon, turns eastward to the point where the system becomes one great range. In the northern portion, in Peru, three distinct chains can be traced, whilst in the south there is the great plateau of Bolivia, the largest in the whole cordillera. Its elevation above sea-level is about two and a half miles, whilst many of the peaks in the enclosing ranges reach the great height of four miles. A large part of the Bolivian plateau is a continental basin drained to Lake Titicaca (see Fig. 121).

On these plateaus the rainfall is very small, except on the eastern slopes, where there is the "montana," to which reference has already been made. The temperature is lowered by elevation, and tends towards extremes, especially in the *punas*, the name given to the

higher and bleaker parts of the plateaus. Tuft grasses grow, so that pastoral pursuits form one of the chief occupations. The chief animals reared are cattle, sheep, and goats, but numerous llamas and alpacas find sustenance, and provide both food and clothing and wool for export. The male llamas are trained to carry

burdens up to 100 lb. in weight. Being very sure-footed they are of great importance in an area where the ordinary means of communication are so difficult. The llamas and alpacas are pastured in very large flocks. The vicuña, an animal of the same genus, is also found, but it is generally met with in a wild state on the higher plateaus.

Some areas, where the climatic conditions are more favourable, or where irrigation can be practised, are suitable for the production of tem-

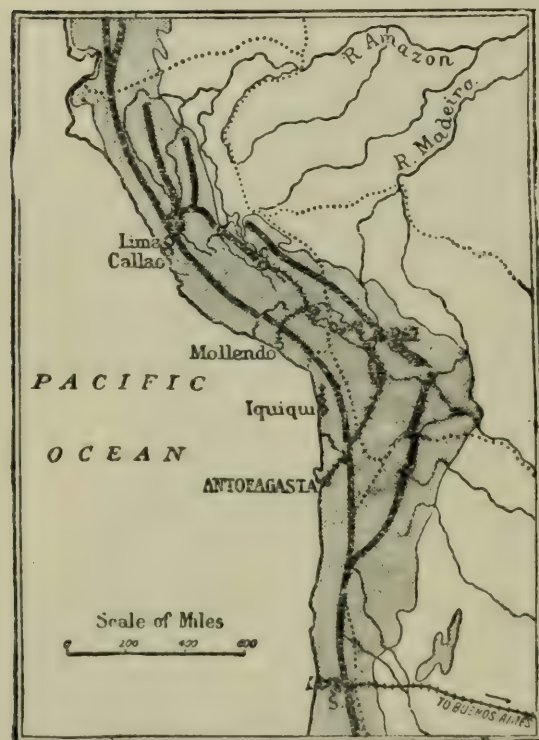


FIG. 121.—Map of the Peruvian and Bolivian Plateaus. The thick lines show the direction of the main Andean ranges. The high ground is shaded.

perate cereals, especially maize. A large amount of this grain is grown, but not so much as in the old Inca days.

The mineral wealth is enormous. The most famous silver-mines of history are those of Potosi, in Bolivia. Silver is also mined at Cerro de Pasco, in Peru. Besides silver, there are rich deposits of copper (easily first in order of value), tin, and petroleum.

On the whole, we must place the greater part of these plateaus among the regions of lasting difficulty. (See p. 42.)

THE WEST COAST DESERT OF NORTHERN CHILE AND PERU.

This "west coast, trade wind" desert occupies the Pacific slope of the Peruvian and Bolivian plateaus. The only areas where vegetation is found are the narrow ribbon-like bands following the rivers which cross this region on their journey from the Andes to the sea. In these oases, which may be called "little Egypts," cotton and sugar can be grown.

Although in many ways a great drawback, the rainless character of the Atacama (North Chile) desert has preserved its most important commercial product. The chief fertilizing constituents have not been washed out of the soil, and vast quantities of nitrates, much sought after, not only for supplying poor and exhausted soils with the necessary constituents, but for the manufacture of chemicals, have thus been preserved. *Iquique* and *Antofagasta* are the chief ports trading in nitrates. Other minerals, especially copper, are mined, but at present nitrates are of prime importance.

THE MEDITERRANEAN REGION OF CENTRAL CHILE.

This region of winter rainfall lies south of the Atacama desert. A coastal range borders the Pacific; to the east there towers the great snow-clad chain of the Andes, whilst between the two there lies the long, narrow plain or valley of Chile.

This valley is more thickly peopled than any other part of the west coast of South America, and it is one of the few parts of South America suitable for the settlement of white people. All the fruits of similar regions can be grown, but the most important is the

vine. Considerable quantities of wheat and barley are grown and form important exports, although not so much is exported as formerly, owing to the increasing home demand.

In the northern part of this region there are very rich deposits of iron ore, whilst in the south coal is found.

SOUTHERN CHILE.

We have compared this region with the coastal belt of British Columbia. Each region shows extensive signs of glaciation and sinking. In each, the coast range is represented by islands, and the narrow plains behind the coast ranges have been drowned; the coast of each is indented and pierced by long arms of the sea which resemble the fiords of Norway, and the sea lochs of the west of Scotland and Ireland. Magellan Strait is a fiord piercing right through the mountain range, thus separating the island of Tierra del Fuego from the mainland. Notice, too, that the Andes decrease in height as they go farther south, and also that the Falkland Isles stand on a broad continental shelf. These things are further evidences of sinking. Like British Columbia, it is a region of mixed deciduous and coniferous forests, a source of almost virgin wealth. Cattle- and sheep-rearing is carried on in the forest clearings in the north, and fishing along the coast. Very many of the islands off the coast are uninhabited. The largest and most important is *Chiloe*, which has a cold, wet climate, and is inhabited by Indians.

South of the long, winding Strait of Magellan is the large island of Tierra del Fuego, which is about two-thirds the size of Scotland. Owing to its cold, wet climate, it has very few inhabitants, and the chief occupation is sheep-rearing.

THE COUNTRIES OF SOUTH AMERICA.

NOTES ON THE DISCOVERY OF THE CONTINENT.

In 1492 Columbus landed on one of the Bahama Islands. On later voyages, for in all he made four, he discovered Trinidad, saw the mouth of the Orinoco, and sailed along the coast of Central America, but he never realized that it was a new continent which he had reached, and died believing that he had reached the Indies and the east coast of Asia.

Inspired by the work of Columbus, a Florentine named *Amerigo Vespucci* made four voyages of discovery, of which the third, made in 1501-2, was the most important. This voyage was made on behalf of Portugal. It is important to notice that at this time the two nations most engaged in exploration were the Spaniards and the Portuguese. The latter tried to reach the Indies by sailing eastwards and the former by the westward route. When Columbus reached the West Indies, the Pope issued a Bull in which it was stated that a line should be drawn from pole to pole 100 leagues west of the Azores and the Cape Verde Islands, and that the Spaniards were to have all the land they discovered to the west of that line. The Treaty of Tordesillas moved the line of demarcation another 270 leagues westwards, or in all about 1,110 miles west of the Cape Verde Islands. Fig. 122 shows the approximate position of this line. You will see that it gave some of South America to Portugal, although, of course, at that time, none of this had been discovered. Six years later Cabral, in making a voyage from Portugal to the Cape, took a great bend westwards and discovered that there was land within the Portuguese sphere of influence. Of course, he had reached Brazil. He sent the news to Portugal, and Amerigo Vespucci was invited to take charge of the expedition to explore the new land. This has been

saint for the day. Examine Fig. 122, and you will find a selection of places with the dates appended. The name Rio de Janeiro is probably of later origin.

Having made four voyages to the mainland of South and Central America, Vespucci could not fail to recognize that it was a new continent which had been reached by Columbus. The unfolding of the east coast of South America was continued by Juan Diaz de Solis, who reached the mouth of the Plate River whilst in search of a passage to the East Indies. It was on the banks of this great river that he was killed by the natives.

In 1513 Nuñez de Balboa crossed the Isthmus of Panama, and was the first European to see the Great Pacific Ocean, which he called the "South Sea," as he thought it lay off the south coast of Asia. A few years later, on September 20, 1519, *Ferdinand Magellan*, a Portuguese sailing for the Spaniards, set out on his great journey. Arriving at Brazil, his ships coasted along the east of South America. On October 21, 1520, he passed through the strait now bearing his name—it took thirty-eight days to accomplish this—and was the first European to sail the ocean which he named the Pacific on account of its calmness. The name does not by any means describe this ocean correctly. With the rest of this epoch-making voyage we are not concerned at present.

Whilst this first circumnavigation of the world was being carried out, the Spaniards had not been idle in Mexico, Central America, and the West Indies. After the visit of Balboa to the Isthmus of Panama, stories of lands to the north and south, inhabited by great nations whose wealth was fabulous were common. Cortes was despatched from Cuba to investigate these stories as regards Mexico, and his conquests and discoveries opened up new lands in Mexico and Central America. Another Spaniard, *Francisco Pizarro*, investigated the stories of the El Dorado to the south. With a companion, Diego de Almagro, he made coasting voyages along the north-west coast of South America and heard of the great empire on the plateau of Peru.

Obtaining the permission of Charles V. to conquer Peru (this was given on the usual terms, viz., that the monarch should receive one-fifth of all the spoils), he set out with a small force of less than 200 men, and made at once for Cuzco, where he found an even more advanced civilization than Cortes had found in Mexico. He captured Atahualpa, the Inca emperor, who offered to pay a huge ransom. This was paid, but Atahualpa was nevertheless put to death, and his country, with its great riches, became part of the Spanish possessions.

While Pizarro was subduing and enslaving the Incas, Almagro had reached, but was not successful in conquering, Chile. Pizarro's brother crossed the Andes, and in 1541 found the headstreams of the Amazon, which was followed to its mouth by one of his companions named Francisco de Orellana. The river received its name from the reports which the latter made of tribes of female warriors. It was Orellana who circulated the stories of an El Dorado up the Orinoco, and this led to the unhappy expedition of Sir Walter Raleigh.

It will thus be seen that fifty years after the first voyage of Columbus, the coastline of South America was fairly well known. The whole continent was given by the Papal Bull to Spain and Portugal, the latter having Brazil. The Spaniards also held Central America, Mexico, large parts of what is now the United States, and all the West Indies. To-day, not one square mile is either Spanish or Portuguese.

The Spanish and Portuguese conquests have, of course, influenced the languages spoken in America south of the United States. Spanish is the language everywhere, except in the possessions of European countries and in Brazil.

COLOMBIA.

Colombia consists of—

- (i) An Andean region.
- (ii) A Llanos region.
- (iii) An Amazon forest region.

What will this country export? Notice its natural regions and its position, and remember the three zones of climate in the Andean section. There should be no difficulty in writing out a list which would include coffee, cacao, rubber, hides, and skins. Add to these the minerals, especially gold, of the Medellin mines.

The larger portion of the five and a half million inhabitants, of whom 90 per cent. are of mixed Spanish and Indian descent, live in the first region, especially in the valleys of the Cauca and the Magdalena, and on the high plateau. *Bogota*, the capital, is the largest city. It lies on the high, but fertile plateau. Barranquilla and Cartagena are the chief ports on the north coast, and Buenaventura the principal Pacific port.

VENEZUELA.

The name of this republic requires some explanation. It was given by Amerigo Vespucci during his second voyage (1499-1500). He was then sailing on behalf of Spain, and when the ships sailed into the great Gulf of Maracaibo, he found that the Indians built their villages on piles driven into the sea. Amerigo, who was an Italian, compared them with Venice, and gave the name Venezuela, or Little Venice.

The country comprises the following natural regions—

- (i) The northern portion of the most eastern of the three ranges which make the northern Andes. (Notice that this range hinders communication between the coast and the interior.)
- (ii) A Llanos region.
- (iii) A Guiana highlands region.
- (iv) An Amazon forest region.

Most of the two and a quarter million people, of whom the great majority are of mixed descent, live in the first area, the uplands having a healthier climate than the other regions. This part of the country produces sugar, coffee, and cacao. The llanos area produces cattle and hides, whilst rubber is the chief article of

export from the coastal plains which skirt the Guiana highlands, and from the Amazon lowlands on the south. The principal mining industry is the production of gold near Bolivar. There are few manufacturing industries, even the sacking necessary for the export of Venezuelan produce has to be imported.

Caracas (port La Guaira) is the capital.

THE GUIANAS.

	Area in sq. mls.	Population.
<i>British Guiana</i> . . .	90,000	300,000
<i>Dutch Guiana</i> . . .	46,000	85,000
<i>French Guiana</i> . . .	30,500	49,000

The three Guianas are the only parts of the mainland of the continent ruled by European countries. Each contains two regions—

- (i) A Guiana highlands area.
- (ii) The equatorial forests of the coastal plains.

The chief crops are tropical plantation products, such as sugar, coffee, cacao, rice, and bananas. Gold is mined in the mountains and found in the streams, and forms an important export of each colony.

Georgetown, in the district of Demerara, which gives its name to a kind of cane sugar (sugar, molasses, and rum form the chief group of exports), is the capital of British Guiana.

The capital of Dutch Guiana, or Surinam, is *Paramaribo*, and of the French area, *Cayenne*. The last-named town stands on an island of the same name which is used as a penal settlement.

ECUADOR.

This country, which gets its name from the word "equator," has within its frontiers—

- (i) An Andean area.
- (ii) An equatorial forest area (including Montana).

Most of the people, of whom three-quarters are Indians, live in the first area, for the Amazonian area is largely virgin forest. The majority of the people are engaged in agricultural or pastoral pursuits. In the coast region and the lower river valleys (the *Tierra Caliente*) tropical agriculture is carried on, and cacao, coffee, and rubber are the chief exports. In the hill country and on the plateau, grazing, dairying, and the production of the cereals and fruits of temperate climates are the chief occupations, and hides are the chief export. *Guayaquil* is the chief port, and is connected with *Quito*, the capital, by a railway which has to climb 8,700 feet in order to reach the plateau on which the city stands. (See p. 17 and Fig. 123.) The Galapagos Islands, which are about 750 miles due west of Ecuador, are owned by that country. They have a population of about 400, and are noted for their giant tortoises and turtles.

PERU.

This important republic of four and three-quarter million people contains three regions which are sharply contrasted, viz.—

- (i) A narrow west coast desert region.
- (ii) The Peruvian plateau.
- (iii) An Amazonian and Montana forest region.

Flocks of sheep, alpacas, llamas, and vicunas find support on the grasslands of the plateau, and the mountains are very rich in minerals. Remembering this, and keeping in mind the natural regions stated above, we shall expect the chief productions to include: sugar, coffee, and cotton (from the irrigated valleys of rivers crossing the desert); wool and metals (from the plateau); rubber, cacao, and cinchona (from the Amazon forests and Montana).

Of these regions the Amazon forest area is most difficult of access. The best way of reaching Iquitos is by way of the Amazon. It is proposed to continue

the railway from Callao, which reaches Cerro de Pasco via Lima and Oroya (see Fig. 123), to Iquitos, using one

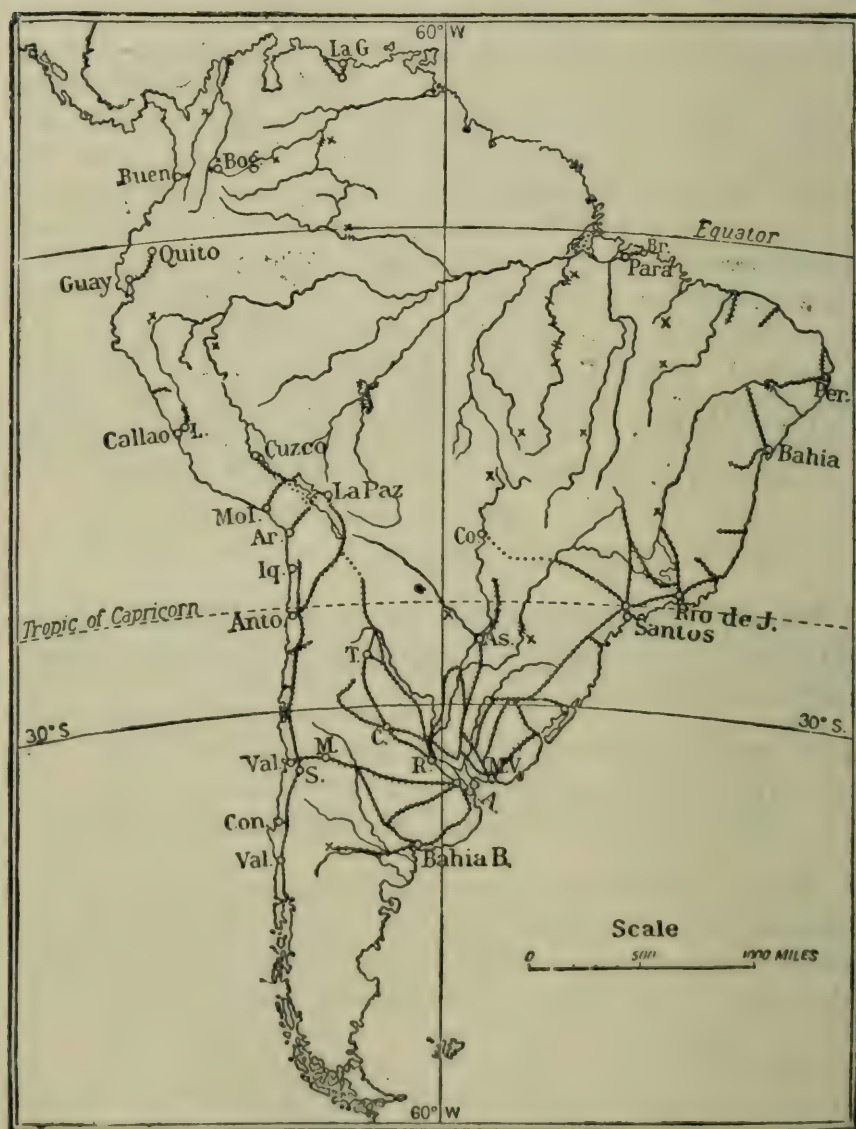


FIG. 123.—The chief means of communication.

of the headwaters of the Amazon as a means of descent from the plateau.

The capital, *Lima*, once the centre of Spanish rule, has a magnificent cathedral, but most of the houses are built of adobe, or mud-brick. *Callao* is the chief port.

Both cities are in the valley of the Rimac, whose waters not only irrigate the thirsty land across which it flows, but provide power for driving the trains up the steep inclines they have to overcome in the journey from Callao to Cerro de Pasco. *Cusco*, which lies in a fertile intermost valley, is the old Inca capital. It is connected by rail with *Mollendo*, the chief port of southern Peru (see Fig. 123).

BOLIVIA.

The natural regions of Bolivia are—

- (i) The plateau.
- (ii) An Amazon and Montana region.
- (iii) A Savannah region.

Bolivia and Paraguay are the only countries in South America which have no coastline. Since the various republics have been formed, there have been many wars owing to boundary disputes, and after one of these in 1879–81 Bolivia lost her Atacama desert strip of coastline, although she still has certain rights of access to the sea across the coastal lands of Chile and Peru. The majority of the inhabitants (there are nearly three millions, of whom one-half are Indians, and one-quarter of mixed descent) live in the first region, for the others are little developed. The chief exports include rubber, cinchona, coffee, cacao, and minerals, especially tin and silver. Bolivia produces nearly one-quarter of the total tin output of the world, and ranks next to the Malay Peninsula in the production of that metal. The mining industry is kept in a backward state on account of the great difficulty in obtaining suitable labour. Owing to the great elevation it is very difficult to get workmen, for it is not easy to work at such altitudes. Moreover, the natives are not naturally inclined towards mining.

Since Bolivia has no coastline, its exports have to be sent to the ports through other countries. The railway from Antofagasta to La Paz is now connected with the railways of Argentina, so that much Bolivian trade may find an outlet via Buenos Aires (Fig. 123), although at present the route is little used. Another outlet is provided by the railway from Mollendo to the shores of Lake Titicaca. *La Paz*, the capital, stands on the shores of this lake, and it is connected to the Mollendo line by a lake steamship service. *Potosì* is the chief mining centre.

CHILE.

This remarkably shaped country stretches through about 36 degrees of latitude (18° S. to 54° S.), *i.e.* about 2,500 miles, or almost as long as from Gibraltar to the north of Norway. It will also be noticed that the country is extremely narrow. This is, of course, because it occupies the western slopes of the Andes and their margins, and the Andes are close to the coast. It would appear that such a peculiarly shaped country as Chile would be very difficult to govern. But notice of what natural regions it is composed. They are—

- (i) An Atacama desert region in the north.
- (ii) A Mediterranean region in the centre.
- (iii) A west coast temperate forest region in the south.

We have seen that the central area is the most densely peopled part of the country (Fig. 124), and this is because it has the best climate and is rich in agricultural products. Since the country is so very long, for the purposes of government it is fortunate that the centre has the largest population. In addition, no part of the country is far removed from the sea, so that communication by sea is not difficult.

The capital, *Santiago*, the third largest town in South America, is splendidly situated in the central valley (see p. 445). The chief ports are *Iquique* and *Valparaiso*.

The former is the principal port for nitrates, of which

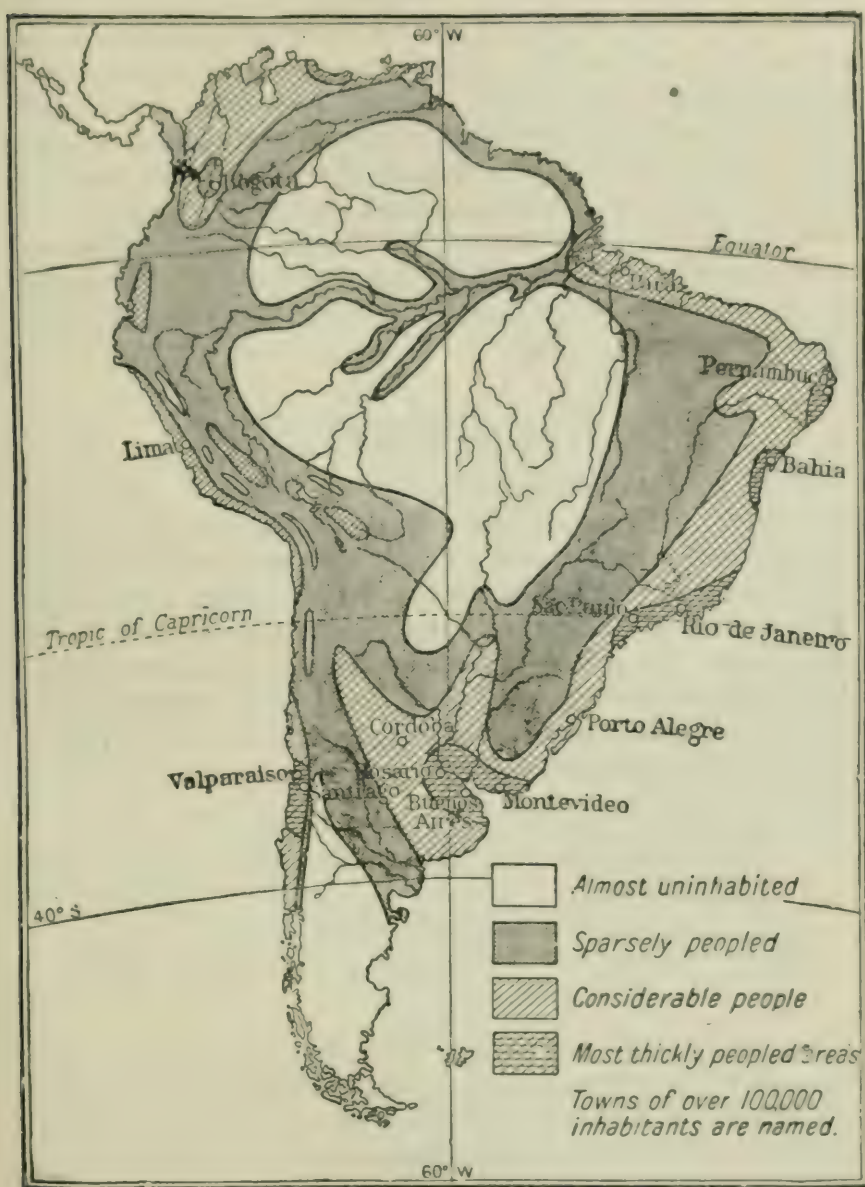


FIG. 124.—The distribution of the population in South America.

nearly 2,000,000 tons per annum are exported. The value of this is about four-fifths of the total exports, so

you can see what this industry means to the country. It is the chief source of taxation. *Valparaiso* is the terminus of the transcontinental line from Buenos Aires, and is the port for the agricultural area of Central Chile. The forests* in the south are as yet little developed. *Punta Arenas*, on Magellan Straits, is the most southerly town in the world. It is a coaling and repairing station, and the centre of a sheep-rearing district.

It is worth noting that the majority of the three and three-quarter million people of Chile are of European origin, and this is because it is one of the places where white people can settle.

ARGENTINE REPUBLIC.

The name Argentina means "silver land." The name La Plata, too, reminds us of the great lure which brought Spaniards to its waters. The silver was not mined in Argentina, but its plains and rivers were routes by means of which the mines of Peru could be reached. The population in this country is chiefly concentrated on the plains of the Plate River. There are large numbers of Italian and Spanish immigrants, for the climate is suitable for southern Europeans. The country contains the following natural regions—

- (i) The forest and savannah region of El Gran Chaco.
- (ii) The grasslands of the Plate basin.
- (iii) The eastern Andes and drier western plains.
- (iv) The Patagonian desert.

Remembering what has been learned about these regions, it is easy to see that the chief products will be wheat, maize, meat, wool, skins, etc. (grasslands), fruits and wines (Mendoza area), sugar and tobacco (Tucuman area).

The second region is the most important. Not many years ago it was "a land of wandering," roamed by nomad Gauchos. Then it became a stock-raising land. Then the better parts were ploughed and made to yield

rich grain harvests, whilst at the same time manufacturing industries based on the country's raw materials were developed, *e.g.* the manufacture of extracts, leather, soap, etc., rather than the wholesale export of meat, hides, and fats. The further industrial development is problematical, for there is little coal, and most of the streams are too slow-flowing to give power. The rapid development of Argentina has been accelerated by the building of a network of railways (Fig. 123), whose construction was aided by the relief of the land (*cf.* the Canadian prairies, p. 381).

The capital and chief port is *Buenos Aires* (= "good air"). It is the largest city in South America, its population in 1916 being estimated at 1,600,000, and it is still growing very rapidly. The estuary of the Plate is shallow, owing to the deposition of sediment, so that Buenos Aires has a very poor natural harbour. At great cost an artificial harbour has been made, and the enormous trade of the port has justified the outlay. From Buenos Aires railways radiate to all parts of the country (compare Figs. 119, 123 and 124).

Rosario and *Santa Fé* are important river ports engaged in the exportation of grain, wool, and cattle. *Cordoba* is the chief centre of the great stock-rearing area west of the Parana. *Mendoza* and *Tucuman* are centres of agricultural areas dependent upon irrigation. The former is on the Trans-Andean Railway, which tunnels below the Uspallata or Cumbre Pass at a height of nearly two miles above sea-level.

PARAGUAY.

A glance at the map of South America will show the inland position of this country. Note the rivers which form its frontiers. Paraguay is largely forested, although its eastern portion contains extensive grasslands. In the west is the Gran Chaco. One of its chief products is yerba maté, or Paraguay tea, whose use the Spaniards learned from the Indians. The backward state of the country is largely due to devastating wars. During the

years 1865-70 Paraguay was fighting the combined forces of Brazil, Uruguay, and Argentina. At the end of the war the population was about 220,000, of whom not 29,000 were males over fifteen years of age. Before the war the population was estimated at 1,400,000! There are now about one million inhabitants, mostly of Indian or mixed blood. The position of the country, far from the coast and the chief lines of communication, has also impeded progress. It has also made it a refuge for natives driven inland by modern commercial expansion.

The leading occupation is cattle-rearing, and in recent years sheep-rearing has met with some success. The chief exports are meat, hides, tallow, maté tea and oranges. Oranges are cultivated or grow wild in all parts of the country.

The capital, *Asuncion*, stands at the junction of the Paraguay and one of its chief tributaries, and is reached in about fifty hours by rail from Buenos Aires. The journey by river takes five days.

URUGUAY.

The physical map will show that this country of warm temperate grasslands has a general slope towards the south-west. The chief occupations are associated with cattle- and sheep-rearing, so that it follows that the trade of the country is chiefly in wool, hides, meat, and extracts. The English firm of Liebig has very large extract works at Fray Bentos and Paysandu on the river Uruguay. Agriculture is increasing in importance, and there is some mining for gold and other minerals on the northern margins of the country. *Montevideo*, the largest city and the chief port, owes its importance to its splendid situation on the Plate estuary. There are nearly one and a half million inhabitants in the country, and the majority are of Spanish descent. There are also many Italians.

BRAZIL.

This large country is very little less in area than the whole of Europe. It has half of the people of South America. It is also remarkable that its boundaries march with those of every other country in the continent except Chile and Ecuador. It comprises the following natural regions—

- (i) The forests of the Amazon basin and the east coast plains.
- (ii) The Brazilian highlands.
- (iii) The warm temperate grasslands of the south.

We are quite familiar with the chief products of these areas. They are: rubber, cacao, coffee, cotton, sugar, meat, hides, etc.

The capital and chief port is *Rio de Janeiro*, which has more than one million inhabitants and is the second largest city in South America. It has a splendid, almost land-locked, harbour. From *Rio de Janeiro* railways climb to the plateau (see Fig. 123). *Santos* is the port for *São Paulo*, the centre of a region producing more than half of the world's coffee. *Bahia* exports cacao, sugar and cotton; and *Manaos* at the confluence of the Negro and the Amazon, and *Para* at the mouth of the Amazon, are the great collecting centres for the rubber of the Amazon basin. Notice Fig. 124, which gives the distribution of the population in South America. Excepting *São Paulo*, the seven largest towns of Brazil are ports. Why is this?

In 1915 the total population was estimated at twenty-six and a half millions. Large numbers of these are of mixed Portuguese and Negro descent, due to the extensive importation of negro slaves for manual work in the plantations. Of European peoples, the Portuguese are naturally in the majority, but there are also large colonies of Germans, Italians, and Russians, especially in the southern provinces where they follow agricultural pursuits.

CONCLUSION.

South America is only in the infancy of its development. The population map (Fig. 124) shows that the bulk of the people are near the coasts, and that there has been little penetration into the interior except in the case of the lowlands of the rivers drained to the Plate estuary, where the development has been very rapid during recent years. These lowlands, like the Mediterranean area of Chile, offer facilities for a greater increase of the population. Except for silver and gold, the mineral wealth of South America has been little exploited. Better means of communication, and the linking up of the various railways, are much needed. The making of the railway from Buenos Aires to Valparaiso, and the opening of the Panama Canal, are bound to have important influences upon South American trade. The conquest of the Andes, accomplished in the construction of the former, should lead to other victories farther north. With regard to the Panama Canal the north-coast ports and those of the west coast north of Valparaiso will gain very considerably, for they will be brought into closer touch with each other and with the ports of the east of North America and western Europe (see p. 443).

As to the settlement of Europeans in South America, it would appear as though the continent will not attract large numbers of settlers from western Europe, but there are considerable opportunities for people from southern and south-central Europe.

One of the great drawbacks to the advancement of South America is the backward state of the governments of most of the republics. Chile and Argentina are the most advanced countries, and what may be a lasting peace has been made between them. The outward and visible sign of the peace is the bronze statue of Christ which the two countries have placed on the summit of the Cumbre Pass, and on which they have carved the words—

"SOONER SHALL THESE MOUNTAINS CRUMBLE
 INTO DUST THAN THE PEOPLE OF
 ARGENTINA AND CHILE BREAK THE PEACE
 WHICH THEY HAVE SWORN TO MAINTAIN AT
 THE FEET OF CHRIST THE REDEEMER."

It would be a great step forward if the other republics, indeed, if all countries, would settle their boundary disputes in the same way. Colombia touches five other countries, and is in the unhappy position of having a very considerable extent of her frontiers unmarked. The general backwardness of the continent is one of the legacies of three hundred years of Spanish misrule and oppression. Other factors are the absence of a pure-bred, vigorous white population, and the presence of so very many inhabitants of mixed descent. The latter are always difficult to rule, and have largely contributed to the numerous insurrections and revolutions for which Mexico, Central and South America are notorious.

EXERCISES.

1. Compare the general build of the two Americas.
2. Compare the distribution of rain on the west coast of South America with that on the west coast of North America.
3. Make the following series of maps of South America—(1) Structure ; (2) Relief ; (3) July Temperature ; (4) January Temperature ; (5) July Rainfall ; (6) January Rainfall ; (7) Mean Annual Rainfall ; (8) Seasonal Distribution of Rainfall ; (9) Natural Vegetation ; (10) Natural Occupations ; (11) Chief Products. Now, making use of all these, attempt to draw a map showing the natural regions of South America. Draw all the maps to the same scale.
4. Show how the distribution of natural vegetation in South America is determined by conditions of relief, structure, climate, and soil.
5. In what parts of South America are the following produced : coffee, cotton, wool, rubber, wine, wheat? Account for their distribution.
6. Take any three regions in South America, and name those regions in North America which may be compared with them. Point out the comparisons, and also any contrasts you may observe.
7. Give the position and importance of each of the following cities, illustrating your answers by sketch-maps: Buenos Aires ; Rio de Janeiro ; Valparaiso ; Manaus ; Para ; Quito. How has the geographical position of each city influenced its growth?

8. MEAN MONTHLY TEMPERATURE, IN DEGREES FAHR.

	Height above sea-level.	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year.
	Feet.													
{ Manaos . . .	121	78	78	78	78	78	79	79	79	80	80	81	80	79
{ Quito . . .	9,350	54	54	54	54	55	55	55	55	55	55	54	54	54.5
{ Antofagasta . .	13	71	70	69	66	64	63	62	62	62	63	63	68	65
{ Salta . . .	3,965	71	70	68	67	57	51	52	56	62	67	71	72	64
{ Asuncion . . .	344	80	80	78	73	66	61	65	67	68	73	77	81	72
{ Rio de Janeiro	197	77	78	77	74	71	68	67	69	70	71	73	75	72.5

MEAN MONTHLY RAINFALL, IN INCHES.

	Jan.	Feb.	March.	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total for year.
{ Manaos . . .	9.8	9.6	11.9	13.0	7.5	5.1	3.0	1.8	1.5	3.9	6.4	10.3	83.8
{ Quito . . .	4.2	4.0	5.3	7.3	5.1	1.5	0.9	1.5	2.9	3.7	3.8	3.9	44.1
{ Antofagasta . .	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
{ Salta . . .	5.4	4.8	4.0	1.1	0.4	.0	.0	0.1	0.2	0.5	2.2	3.4	22.1
{ Asuncion . . .	6.8	5.3	6.1	5.8	4.4	2.9	2.4	1.8	3.5	5.5	5.9	5.2	55.6
{ Rio de Janeiro .	4.8	4.4	5.1	4.6	3.7	1.9	1.7	1.9	2.3	3.1	4.3	5.6	43.4

Find the position of each of these places. Notice that the last four towns are almost in the same latitude. Draw the curves for the temperature figures and columns for the rainfall figures, keeping the bracketed towns on separate diagrams. When you have drawn the diagrams, write a full description accounting for all contrasts or similarities which you notice.

9. Compare the present development of the prairies of North America with that of the pampas lands of South America.

10. Into what natural regions may Chile be divided? State clearly the reasons for their differences. Which of these areas is best adapted for settlement? Why?

11. Write an essay on the opportunities for settlement which South America offers to Europeans.

12. "Better means of communication and the linking up of the various railways are much needed." Discuss the statement in its application to South America.

13. Account for the distribution of the people of South America as shown by Fig. 124.

14. How do you think the League of Nations could render valuable service to the South American republics?

PART VII

AFRICA

GENERAL AND PHYSICAL CONDITIONS.

THE RELIEF OF AFRICA.

AFRICA is almost entirely an enormous plateau, composed of great sheets of ancient rocks which lie practically undisturbed in horizontal layers. Only in the extreme north-west and south-west are there areas which structurally do not belong to the plateau. This enormous plateau is probably a fragment of a much older continent, which stretched across the southern hemisphere (see Fig. 75). A physical map of Africa will show that so narrow are the continental shelves round its coasts, and so near the coast are waters deeper than 1,000 fathoms reached, that even if the continent were up-lifted a mile, the alteration to its present shape would be comparatively insignificant.

But the African plateau is not of uniform elevation, as an examination of a physical map will show. It is much higher in the south and east than in the north, where the continent reaches its greatest breadth. In a broad belt stretching in a N.E.-S.W. direction from the southern Red Sea to the south-western coast, the plateau reaches a minimum elevation of between three and four thousand feet. This high belt is crossed in its northern portion by the Great Rift Valley (see Fig. 125).

It follows from this account of the simplicity of the structure of Africa that the continent will be remarkable for its compactness and the regularity of outline.

The absence of long peninsulas and arms of the sea penetrating far inland as in Europe, has had a great deal to do with that difficulty of access to the interior lands which, until comparatively recent times, caused Africa to be known as the Dark Continent.



FIG. 125.—The Great Rift valley.

Nor can the interior be easily approached by means of the natural gateways, the rivers, for the plateau character of the continent causes the rivers to have falls in their courses at the points at which they leave the plateau for the plains (*e.g.* the Livingstone Falls of the Congo), and thus their navigation is impeded. This is another reason for the comparatively recent exploration of the interior lands of the continent.

CLIMATE.

Most of the continent lies within the Tropics, and even the extra-tropical parts are in warm temperate latitudes. From this we shall expect to find that a great part of Africa will have a high mean annual temperature, but we must not forget that in most parts altitude will reduce temperature, especially in the east and

south, although only in the high Atlas and south-western areas does the temperature fall so low as to be suitably described by the word "cool."

Fig. 126 gives the January and July sea-level isotherms. It shows that the hottest region in January is south of the equator, and in July north of the equator. These

areas north and south of the equatorial belt have higher temperatures at their summer seasons than are ever experienced in the equatorial belt. They also have a distinct seasonal range of temperature, whilst the difference between night and day temperatures is also very well marked. The equatorial belt is remarkable for its equable temperature, there being little difference between night and day, and "winter" and "summer" temperatures. Fig. 127 gives the mean annual rainfall of Africa. It shows that from the equatorial belt of heavy rainfall (50"-75"), the amount of rainfall diminishes* until the

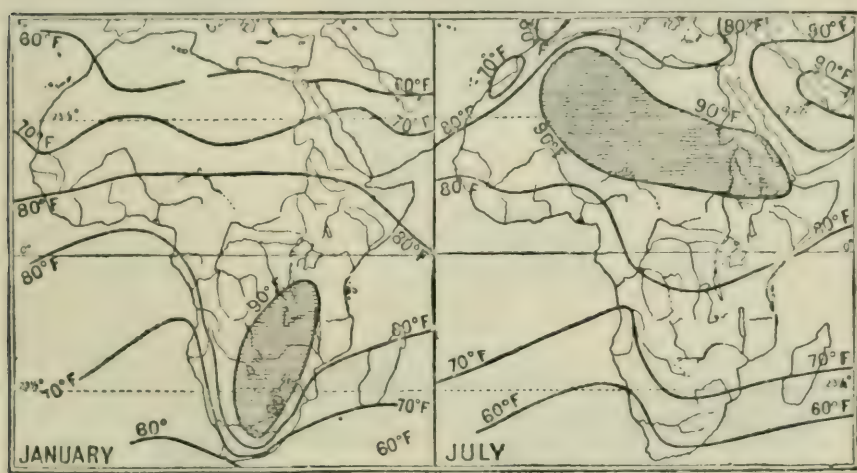


FIG. 126.—January and July sea-level isotherms.

almost rainless Sahara and Kalahari regions are reached. Then we come to the north-west and south-west areas, where rain falls. In January, when the sun is overhead in the southern hemisphere, the area of heaviest rainfall, as well as of highest temperature and lowest pressure, is also south of the equator, whilst in July the conditions are reversed. Indeed, as is clearly shown by Fig. 128, there is a very close connection between the apparent migrations of the sun, the heat equator and the low-pressure belt on the one hand, and the rain on the other. Considering together Figs. 127 and 128 it is evident that the belt near the equator has a heavy rainfall with no distinctly dry

season, although the wettest seasons are near the equinoxes, when the low-pressure doldrums belt is nearest the equator. The migration of this belt, and of all the pressure belts, gives, north and south of the equa-

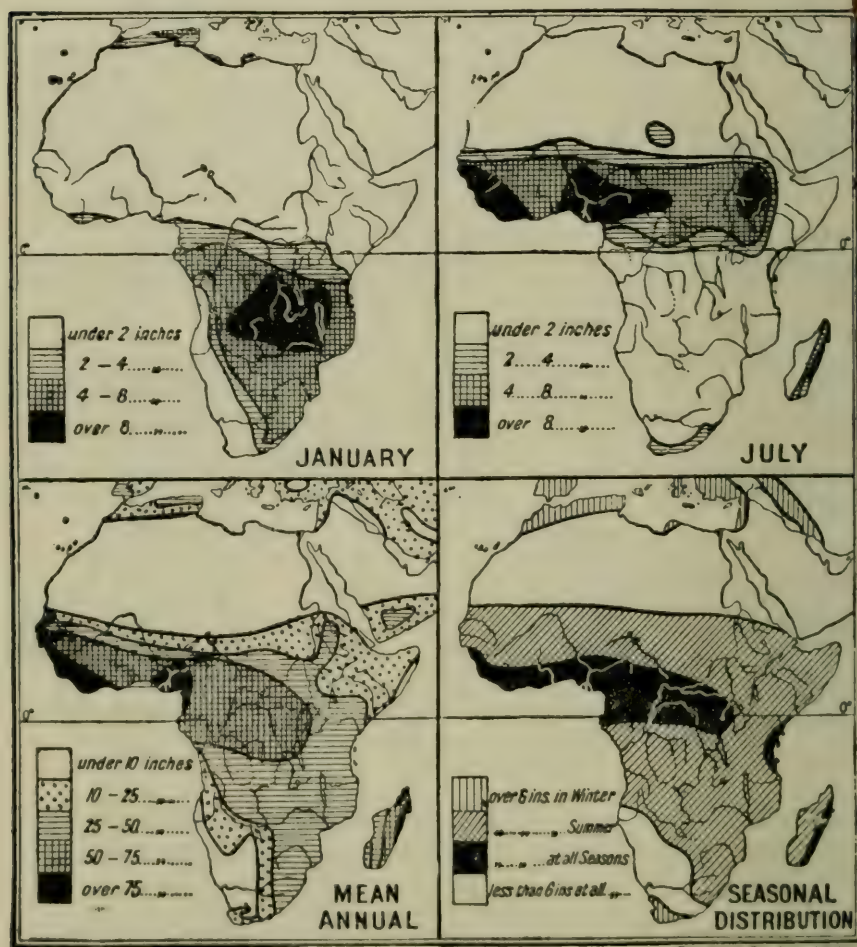


FIG. 127.—Rainfall maps.

torial belt of rain at all seasons, two belts where the rain falls only in summer (see Fig. 17). These are succeeded by dry belts, which experience the trade winds at all seasons, for they are unaffected by the migration of the pressure belts. In the north-west and south-west, the

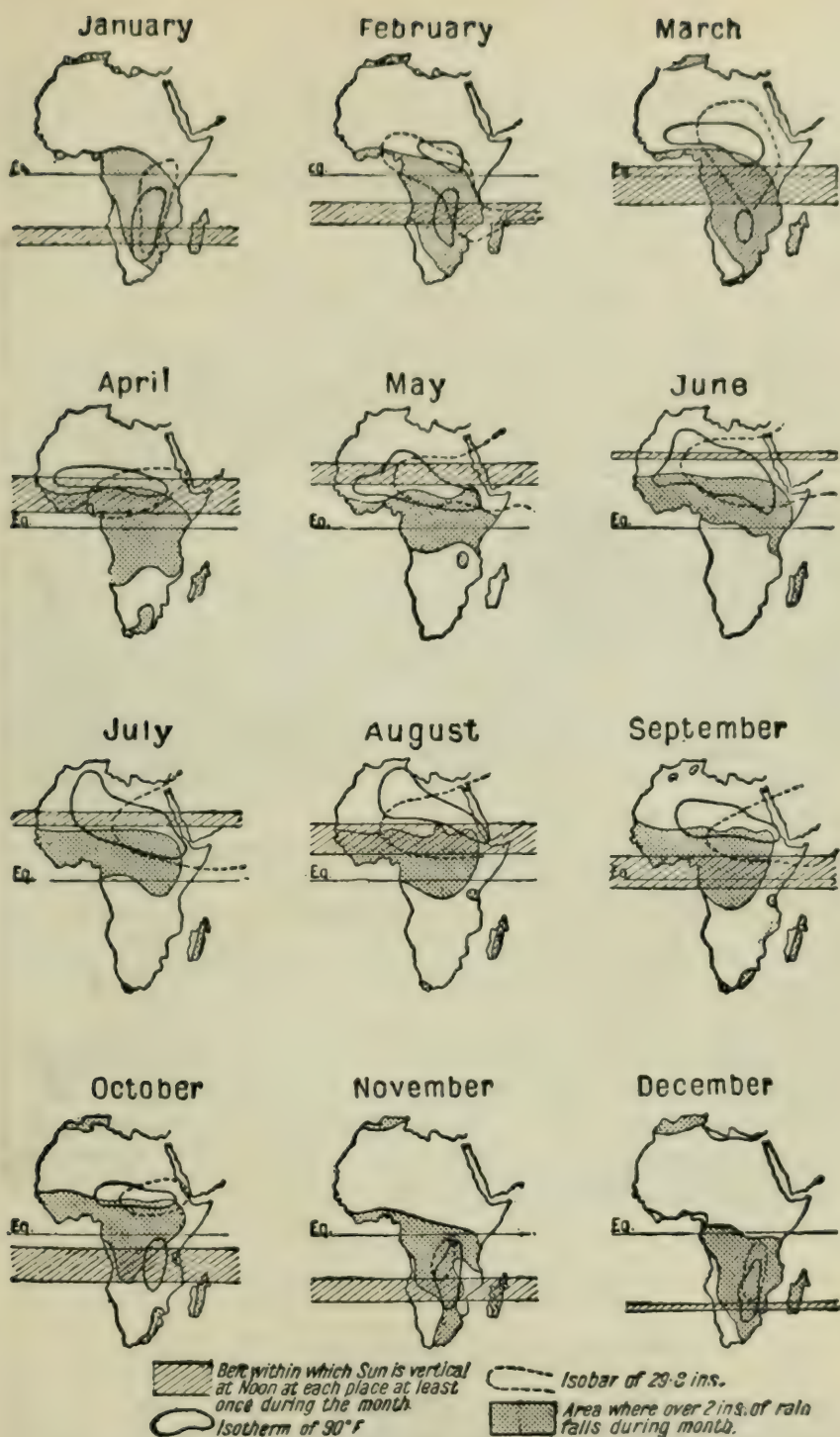


FIG. 128.—The connections between the apparent migration of the sun, and the distribution of temperature, pressure and rainfall.

migrations of the pressure belts give low pressure in winter and high pressure in summer, thus giving the winter rain and summer drought which are typical of the *Mediterranean Type of Climate*.

NATURAL VEGETATION.

The effect of the climatic conditions is clearly seen in the distribution of natural vegetation, the vegetation zones closely corresponding to the climatic zones (Fig. 18). The Guinea Coast and Congo basin belt of constant heat and moisture is marked by equatorial forests. Similar forests are found along the narrow east-coast plains and on the coastal plains of Madagascar.

Outside the equatorial belt, the growth of vegetation in Africa is largely influenced by the presence of a distinctly dry season. To the north, south and east of the tropical forests there are the vast areas known as savannahs, tropical grasslands interrupted by clumps of trees, and often called park-lands on account of their picturesque appearance.

Northwards and southwards the savannahs pass very gradually through an intervening scrubland into desert, the Sahara in the north, the Kalahari in the south. In the scrublands the dry conditions compel the sparse vegetation to adopt means of obtaining or conserving moisture.

North of the Sahara and south of the Kalahari, deserts merge very gradually into scrublands, and these in turn change to the "Mediterranean" vegetation of the Atlas region and the Barka peninsula in the north and of the south-west corner in the south.

THE ATLAS REGION.

PHYSICAL FEATURES AND CLIMATE.

This region lies in north-west Africa, west of the Gulf of Gabes and north of the Sahara desert. Along the coastal margins of all three of the Atlas States there

is the *Tell*, a belt of undulating country consisting of low ranges and fertile plains, and varying in width from fifty to a hundred miles. South of the Tell rise the ranges marking the northern boundary of the Atlas Mountains proper. In the north-west, the Er Rif Mountains form the eastern continuation of the Sierra Nevadas of south Spain, from which they are separated by the narrow Straits of Gibraltar (see Fig. 129). Farther eastwards, the Little Atlas, separated from Sicily by a broad but shallow strait, are part of the mountain system which extends through Sicily and the Apennines of



FIG. 129.—The Atlas region.

Italy to the Alps. On the Saharan margins of the Atlas system are the High Atlas, whose peaks attain an elevation of over two and a half miles, the Anti-Atlas and the Saharan Atlas. Between these northern and southern mountain chains lies the high plateau of the Shotts.

Over a large part of the Atlas region the climate is of the Mediterranean Type, but the varied relief causes strong contrasts, especially between the climate of the Tell and that of the plateau of the Shotts.

NATURAL VEGETATION AND CHIEF PRODUCTS.

In all the best watered parts the typical vegetation is of the Mediterranean type. The trees of the forests

are cork oaks, olives and cedars on the lower slopes, with deciduous and coniferous forests on the upper slopes. But vast areas of forests have been destroyed, and trees are not so common as formerly. Many of the lower slopes of the mountains have been terraced and planted with olives, vines, mulberries, oranges, lemons and other fruits, whilst all these, as well as wheat and barley, are produced in the Tell, the most fertile part of the whole region. But even in the Tell it is often necessary to supplement the rainfall by irrigation methods. In Roman and Phœnician days, the Tell of Algeria and Tunis was one of the chief granaries in the Mediterranean region, the ruins of irrigation works, aqueducts and ancient cities testifying to the former importance of the region, and to the fact that the rainfall has probably decreased, even within historic times.

At best, the plateau is little better than a poor steppe-land, where camels, sheep, horses and goats are pastured, finding sustenance very largely in the sweet-smelling herbage which grows there. Alfa, or esparto grass, also covers much of the plateau. It is exported for use in the making of paper. South of the Anti-Atlas and the Saharan Atlas Mountains is the Sahara desert.

POLITICAL DIVISIONS.

Except for the town and district of Tangier which have been decreed to constitute a special international zone, and for a small strip of north Morocco opposite to Spain, the whole of the Atlas region is under the control of France. Algeria is a Colony, and sends deputies to the French parliament, whilst Morocco and Tunis are protectorates.

All three of the Atlas states include three distinct areas: the Tell, the high plateau, and a Saharan area. It is therefore easy to name the natural occupations of each. But all the states have not reached the same stage of economic development. Morocco is very backward indeed. There are neither railways nor good roads, and little attention is paid to irrigation. In Algeria great

attention has been paid to all these. Besides agricultural and pastoral occupations, mining for iron ore, zinc, lead and copper is increasing in importance, especially in Algeria and Tunis, from both of which large quantities of phosphates are also exported.

Fez, Algiers and Tunis are the capitals and chief cities of their respective countries. The chief railway traverses the Tell from Tunis to Oran via Algiers and Constantine, and sends branches to the ports of Bona and Philippeville, as well as to the oasis of Biskra, far-famed for its dates.

The Islands of North-West Africa.—The groups of small islands off the north-west coast of Africa may be included with the Atlas region on climatic grounds. They are the Azores and the Madeiras, which belong to Portugal, and the Canaries, which are Spanish. They are all of volcanic origin, and on that account possess fertile soil, although the considerable destruction of forests has led to much of the soil being washed away. All these groups lie within the Mediterranean belt, and produce all the usual fruits, as well as early vegetables. The Canaries, however, lie so far south that they are not affected by the winter westerlies so much as the other two groups, and on that account are much drier.

Angra is the chief town in the Azores, but the best harbour is at *Horta*. *Funchal*, the chief city in the Madeiras, is a port of call for steamers bound for South America or the Cape. In the Canaries (the Fortunate Isles of the ancients), *Las Palmas* is the capital and largest city. It is a port of call for vessels proceeding to South Africa, India and the Far East.

THE SAHARA, INCLUDING TRIPOLI.

PHYSICAL FEATURES AND CLIMATE.

Structurally, this desert largely consists of horizontal sheets of sandstone and limestone, which in places have been pierced by crystalline rocks. Physically, it is a large plateau, most of which is of a lower eleva-

tion than one thousand feet above sea-level. It reaches its highest elevations, 7,000–9,000 feet, in the belt of plateau highlands (the Tibesti Plateau) which diagonally crosses the central Sahara from north-west to south-east.

Over most of the area the total annual rainfall is very small indeed, and most of the rain which falls is brought by violent and sudden thunder-storms, whose occurrence is very irregular and uncertain. The differences between night and day temperatures are more marked than the seasonal differences, and lead to very important results. During the day the hot rays of the sun pour down upon a surface unprotected by vegetation covering, and cause the surface layers of exposed rocks to expand. When the sun sets, the nights, owing to the rapid radiation, are very cold and contraction takes place. This expansion and contraction of the surface layers produces splitting, and rock fragments fall to the ground, the smaller particles being carried away by the wind to be piled into sand dunes, the larger ones for the time remaining behind, but finally they, too, are reduced to sand. The great terror of the caravan traveller is the *simoom*, or desert sandstorm, a cyclonic disturbance which carries along with it great quantities of sand, which at the best fills the ears, eyes, mouths and noses of unfortunate travellers and camels, and at the worst completely buries them beneath heaps of sand.

VEGETATION AND THE OASES.

The Sahara has many water-courses called wadis (= water), but very rarely are they filled with water for any considerable time. Along the semi-desert margins and on the outskirts of oases, dry, coarse grasses are found, and there, nomadic tent-dwellers rear herd of sheep, camels and goats, although their life is somewhat precarious, and frequently they have been driven to raiding and plundering the more fortunate inhabitants of the oases. The oases are situated in places where there are permanent supplies of water, as along lines of

depression, or along the flanks of the Tibesti Highlands, or where, owing to the geological structure of the rocks, water reaches the surfaces, as in an artesian well. In the Algerian Sahara, the French have actually created oases by the sinking of artesian wells. The date palm, a very important food-tree, and quite indispensable to the desert dweller, is cultivated in all the oases, whilst in those whose water supply is regular, cereals, especially wheat and barley, pulses and fruits are grown.



FIG. 130.—The chief Saharan caravan routes.

THE OASES AND ROUTES.

Travel on the Sahara would be impossible were it not for the oases and the camel, the ship of the desert. A journey across the Sahara from the Mediterranean Sea to the Sudan is no light task and requires quite a lot of organizing. Travel by caravan has greatly declined in recent years: one reason being the practical extinction of the slave trade, which formed the most valuable trade of caravans of days gone by; another being the improved means of railway communication between the

Sudan and the west coast of Africa, so that much of the trade which formerly crossed the desert by caravan is now carried both more quickly and more economically by sea.

Fig. 130 shows the chief Saharan caravan routes. It will be seen that they use as calling-places oases lying in well-defined depressions. More important than any of these is the route along the banks of the Nile, which forms a continuous strip of oases right across the Sahara.

Tripoli.—The best watered parts of this Italian territory are the coastal strips of Tripolitania and Cyrenaica (peninsula of Barka), which could very well be classified with the Atlas region, since they have the characteristic features of a dry Mediterranean type of climate. The extensive Roman remains point to the fact that by careful irrigation both of these areas were formerly more productive than they are to-day, but it is also probable that in those days the rainfall exceeded that at present received.

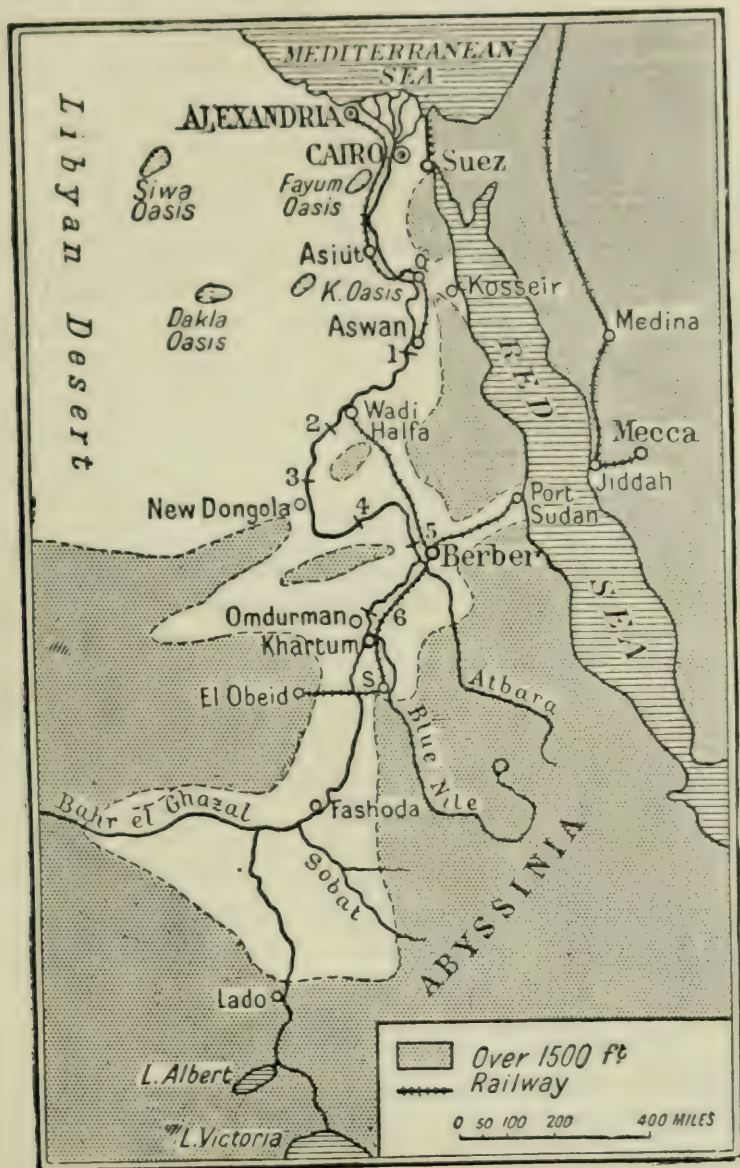
Tripoli is the starting-point of many caravan routes, partly owing to the fact that the deep indentation of the coast gives it the shortest desert crossing from north to south. *Benghazi*, the port and chief city of Cyrenaica, is the starting-point of caravan routes proceeding southwards via the oasis of Kufra to western Anglo-Egyptian Sudan.

THE NILE LANDS.

PHYSICAL FEATURES AND CLIMATE.

The Nile has its source in three great lakes (Victoria, about as big as Scotland, Albert Edward and Albert), situated near the equator. At Gondokoro the river leaves the high plateau for the lower Sudan plateau, and as it falls only 215 feet in its 1,000-mile journey between Gondokoro and Khartoum, it becomes a broad, sluggish stream, forming large lagoons choked by sudd

or floating marsh vegetation, which very considerably



THE NILE VALLEY

FIG. 131.

hampers navigation. In this part of its course the Nile receives the important Blue Nile and Atbara tributaries

which rise in the high Abyssinian plateau lying to the east of the basin. Between Khartoum and Aswan the river falls nearly 1,000 feet, chiefly in six cataracts caused by transverse reefs of granite and other hard rocks (see Fig. 131). These cataracts impede navigation, except at the flood season, when they are covered with water. From Aswan the course again becomes gentle, and the river is navigable right to the sea.

In the region of the equatorial sources, the heavy rainfall plus the drainage of the permanent snow-fields of the Ruwenzori group ensure that the discharge of water from Lakes Victoria, Albert Edward and Albert will be fairly regular. On leaving the lakes plateau the river enters a region of summer rainfall. At first the fall is heavy (the Bahr-el-Ghazal area contains forests), but later it decreases to about 10 to 15 ins. as Khartoum is approached. In Abyssinia, however, the summer rains are heavy, so that the Blue Nile and the Atbara, rivers whose beds for the greater part of the year are only occupied by pools in their deeper parts, are at this season carrying enormous quantities of water to the main stream. It is the extra summer rainfall, brought in by the tributaries, Bahr-el-Ghazal, Sobat, Blue Nile and Atbara, and in particular by the two last-named rivers, which, added to the perennial water brought from the equatorial sources, causes the great wonder of the Nile floods, for the remainder of the course of the river is across a desert receiving practically no rain, except in a narrow strip along the coast, where there are light winter rains.

THE NILE FLOODS AND AGRICULTURE.

Egypt has been aptly named the "Gift of the Nile," for without that river and its floods, practically the whole country would be desert. Even as it is, the cultivated portion is only a long, narrow, oasis strip following the river. The Nile, below its junction with the Atbara, is lowest in May, when most of its waters are received from the equatorial sources. From the middle of May onwards, and attaining a maximum about the end of August

or early September, the Abyssinian tributaries are sending large quantities of water to the main stream. At Aswan the Nile begins to rise towards the end of May or the beginning of June, and continues to rise until the middle of September, when it begins to fall. At Cairo the maximum is reached about the middle of October.

Two distinct types of irrigation must be noticed. They are the *Flood Irrigation* and the *Perennial Irrigation*. The former system, also known as the basin system, is one which has been in use from the time of the Pharaohs. The land on each bank of the river is divided by earth banks into a number of basins all connected by shallow canals which lead the water from basin to basin, those basins farthest from the river receiving the water last. The waters cover the basins to a depth of from three to five feet, the level gradually falling as the floods subside, leaving behind a film of fertile silt. As it is November before the land is ready for planting, it is clear that only winter crops can be grown on land irrigated by this method, for in summer the floors of the basins are baked hard and cracked by the heat of the sun. The chief winter crops are wheat, barley, clover (for cattle), and pulses (peas, lentils and beans).

The crops for which Egypt is most famous are summer crops, but in order to provide water for irrigation at a time when the Nile is low, a perennial system had to be adopted. The methods of ancient Egypt, methods also in use to-day, were to raise water from the level of the river to the fields by means of *shadufs*, or water-lifts, and water-wheels turned by the patient ox. In order to increase the area under perennial cultivation great dams have been built across the river. This ponding of the waters gives a head of water, which forces some of it along deeply cut canals, from which in turn it is led by smaller canals to the fields. These canals are filled naturally in the flood season, and artificially when the Nile is low, so that the fields which they serve are capable of producing crops at all seasons. The Nile was first dammed or barraged at the apex of the delta, but the system has been extended to Upper

Egypt, where the dam at Aswan is the finest of its kind in the world. It is supplemented by a second regulating dam at Siut. The Fayum, an irrigated region west of the river and to the south of Cairo, receives its supply of water from the Bahr-el-Yusuf (River of Joseph), which is in turn supplied from the ponded water behind the Siut dam.

The chief summer crops of Egypt are cotton, sugar, rice, millet and maize. Of these, cotton is easily of greatest importance, and accounts for about four-fifths of the total exports. Besides the cotton itself, the seeds are also of great value. They are crushed for oil, which is used as a cooking substitute instead of the dearer olive oil, as well as for the manufacture of soap and oilcake, the latter for cattle.

POLITICAL DIVISIONS.

Egypt.—Egypt is a British Dependency, under the rule of its native Khedive. Its eleven millions of people are almost entirely found in the Nile Valley and the oases.

Its capital is *Cairo*, the largest city in Africa. The importance of the position of this city lies in the fact that it is placed at the apex of the delta, at the meeting-point of routes from Alexandria and Port Said, and from all parts of the delta lying between these places, with river-side routes coming northwards from Upper Egypt and the Sudan.

Alexandria, the chief port, was founded by Alexander the Great in 332 B.C. Built on a strip of land, an island in Alexander's time, separating the sea from a lagoon or lake, it lies to the extreme west of the delta. In this part of the Mediterranean the currents are easterly, so that Alexandria is much freer from the deposition of silt than it would be if placed farther east.

Of the towns of Upper Egypt, *Aswan* is the most important, especially from the strategic point of view, for in this connection the construction of the great dam has made it one of the "key" towns of the country.

The Suez Canal.—Egypt is of great strategic importance to the British Empire, for the Suez Canal, which is in Egyptian territory, is the main highway between Britain and the far eastern parts of the Empire (India, Australia, etc.). The making of this canal greatly increased the trade between the countries of western and Mediterranean Europe on the one hand and those of Asia and Australasia on the other, and opened up once more the ancient routes to the East which were interrupted by the Turks when their conquests spread over the lands of the eastern Mediterranean. *Port Said*, at the Mediterranean entrance, is a coaling-station with a busy entrepôt trade.

Anglo - Egyptian Sudan.—This large, undeveloped country has been under the joint control of Britain and Egypt since 1899.

In the deserts of the north, settlement is confined to the immediate vicinity of the river or to the scattered oases, and the inhabitants are engaged in agriculture resembling that of Upper Egypt. The central area forms a part of the vast savannahs stretching across Africa from west to east. The marginal scrublands produce large quantities of acacia gum, whilst agriculture is carried on near the river, as well as by nomadic tribes who cultivate the land during the summer rains. The rearing of ostriches, sheep and

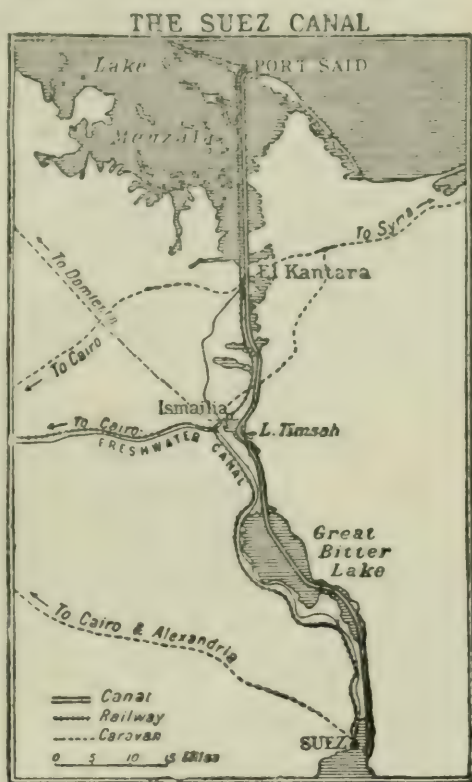


FIG. 132.

goats is also engaged in. Cattle are pastured on the better watered grasslands. In the future it is probable that great irrigation schemes will be adopted for the Sudan, but as at present organized, the amount of water taken from the rivers must be strictly limited in the interests of Egypt. In the southern part of the country the Bahr-el-Ghazal province produces rubber and ivory, which at present form its chief exports.

The capital is *Khartoum*, situated at the confluence of the Blue and White Niles at a point where many routes reach the Nile. It has been well called the key, not only of the Sudan, but of Egypt. Other important river centres are *Wadi Halfa* and *Berber*, both in the northern part of the country and very important on account of the routes they control. The railway routes of the Nile basin are indicated in Fig. 131. It should be noted that except for the break between Aswan and Wadi Halfa, Khartoum is in direct rail communication with Cairo.

THE EASTERN HORN OF AFRICA.

PHYSICAL FEATURES.

The Eastern Horn of Africa is a picturesque name for the great irregular projection of land south of the Gulf of Aden and the southern Red Sea. The most striking feature is the Great Rift Valley which crosses the region from N.-E. to S.-W. (see Figs. 125 and 133). The Red Sea and the Gulf of Aden occupy rift valleys which meet in the triangular lowland immediately south-west of the Straits of Bab-el-Mandeb. This lowland possesses every evidence of volcanic activity. The rift valley is then continued south-westwards, its position being indicated by the Lakes Abaya, Stefanie, Rudolf, Baringo and Nyasa, all of which are on its floor. North-west of this valley the Abyssinian plateau rises to an elevation of about 8,000 feet, whilst on the east it descends very abruptly to the triangular lowland above mentioned. South-east of the rift valley the plateau gradually descends to the coastal plains of Italian Somaliland.

CLIMATE AND NATURAL VEGETATION.

On the Abyssinian plateau there is little range of temperature, owing to the nearness of the equator, but

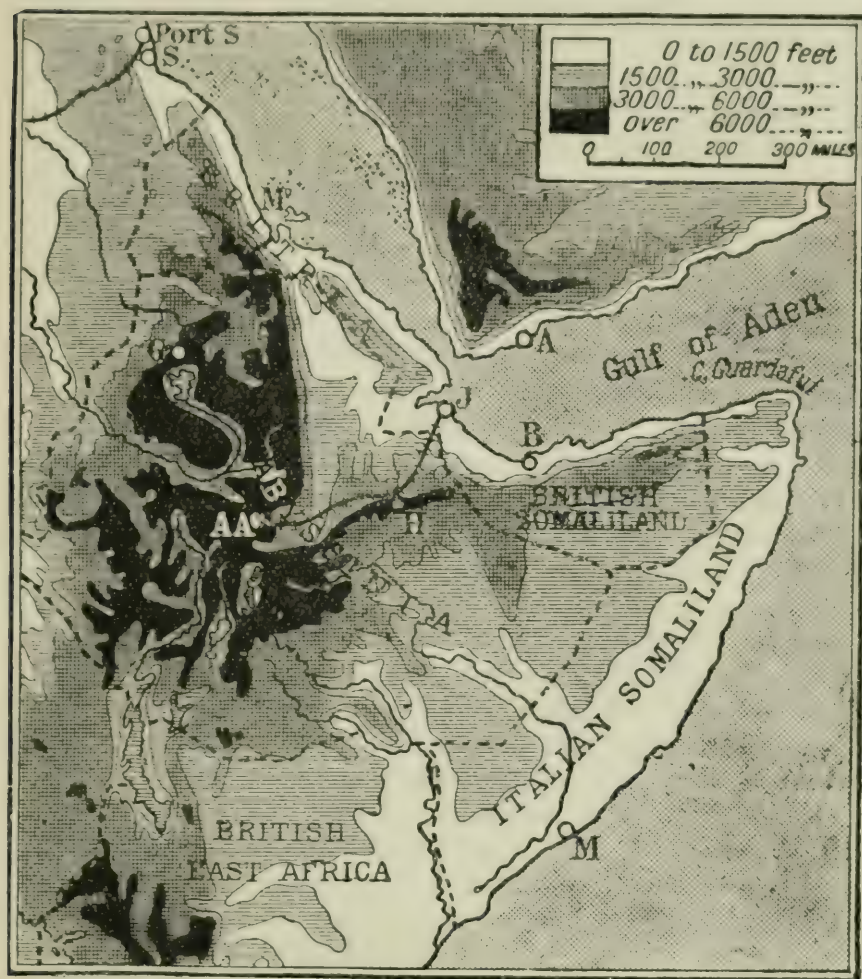


FIG. 133.—The Eastern Horn of Africa.

the temperatures are much lower than on the coastal margins, where the winters are hot and the summers very hot. Everywhere the rains occur in summer, but

in very differing amounts. Abyssinia is well watered, but elsewhere the rainfall is very little (see Fig. 127).

The varied climatic conditions produce many vegetation types. The deep valleys of the Abyssinian highlands are clothed with dense tropical and semi-tropical vegetation, the prevailing type being bamboo forest. On the high tablelands, temperate forests and grasslands are found. Elsewhere the slight rainfall is incapable of supporting much vegetation, and the prevailing type is that of a poor scrubland.

POLITICAL DIVISIONS.

Abyssinia.—Abyssinia owes its independence very largely to its relief. It is mainly a plateau built up of sheets of volcanic basalt into which the rivers have cut deep gorges which offer very poor means of communication, so that intercourse is difficult, not only with the outside world, but also between different parts of the country. It has thus been easily defended by its warlike people, and at the same time its isolation has enabled it to maintain down to the present a form of Christianity, now much debased, which was introduced in the fourth century, whereas the surrounding lands have become Mohammedan. Other results are seen in the fact that the country is only partially known even to-day, whilst the numerous dialects of the different provinces make it difficult for the people of one province to understand those of another.

The lower lands have a tropical climate and produce cotton and coffee. Abyssinia is the home of the coffee plant, which grows wild in the province of Kaffa, from which it derives its name. From 5,000 to 8,000 feet a warm temperate climate is experienced, and the cereals and fruits of the Mediterranean lands are produced. In this region, which also has pastures supporting large herds of cattle, most of the inhabitants are found. At higher altitudes the land is almost entirely pastoral and supports horses, sheep and goats.

There is very little trade with the outside world. Roads are mere tracks, and most of the transport is effected by means of mules, pack-horses and donkeys. A railway (1 metre gauge) runs from the French Somaliland port of Jibuti to Addis Abeba. This will do something towards opening up the country. Excepting *Harar*, overlooking the rift valley from the south, there are few towns in our sense of the word. Even *Addis Abeba*, the capital, is merely a collection of villages, etc., scattered round the royal palace, the whole measuring some three miles in diameter.

Eritrea.—This Italian possession stretches for about six hundred and seventy miles along the western margin of the Red Sea. The north, a part of the Abyssinian plateau, is a pastoral region, the south chiefly salt desert and scrub. Most of the inhabitants are nomadic shepherds. The capital and port is *Massawah*, on a small coral island. From Massawah a railway runs inland to Asmara.

Somaliland.—Somaliland may be compared with the southern margins of the Sahara, both as regards its leading occupations and its chief products. Many of the inhabitants are nomadic shepherds, who wander with their herds of cattle, sheep, horses, camels, ostriches and goats. Hides and skins, ostrich feathers, and frankincense and other products of gum-trees are the chief articles of trade. In some of the better watered parts it is possible to grow maize and other cereals.

French Somaliland is a small territory at the head of the Gulf of Aden. Its chief importance lies in its strategic position, and in the fact that its port, Jibuti, is the outlet of southern Abyssinia, to which it is connected by rail. *British Somaliland* exports all the products mentioned above. Its chief port, Berbera, has a certain strategic value, due to its nearness to the southern entrance to the Red Sea. The richest part of *Italian Somaliland* is the middle basin of the Webi, where the best pastoral lands are situated. The chief port is *Mogdishu*. *Socotra*, an island outlier of the Eastern Horn, is British and is noted for its aloes.

THE SUDAN.

PHYSICAL FEATURES AND CLIMATE.

The word Sudan means "Land of the Blacks," and is the name given to the vast area bounded on the north by the Sahara desert and on the south by the equatorial forests of the Guinea Coast and the Congo basin. In an east and west direction it extends from Cape Verde to the Abyssinian plateau. The Sudan is a portion of the great, low plateau of North Africa. Most of the region lies between 600 and 1,500 feet, but there are considerable plains of lower elevation than 600 feet, situated on the west coast in the lower basins of the Senegal and Gambia rivers.

As regards climate, the winter or cool season is very warm and the summer or hot season very hot—hotter than in the equatorial forest farther south. The rains are confined to the summer months. The amount diminishes from south to north, being from forty to sixty inches on the margin of the equatorial forests and about ten inches on the desert borderlands.

NATURAL VEGETATION AND OCCUPATIONS.

The Sudan is a tropical grassland transition belt between the desert to the north and the equatorial forest to the south. Trees, especially euphorbias and baobabs, do grow in the savannahs, and in the wetter hollows or along rivers they are found in clumps, giving to the region the appearance of a natural park land. As the desert is approached, the vegetation is of a very dry character and consists chiefly of thorny scrub acacias, aloes and cactus. Towards the south the heavier rainfall causes the savannahs to approximate gradually to equatorial forest.

The products and occupations vary in different parts, but as a rule the Sudan is essentially agricultural, except in the drier north and east, where cattle-rearing is the most important occupation. Cattle are reared in *all*

parts of the Sudan, but in the wetter areas agriculture is a much more important industry than the pasturing of animals. Millet is the chief grain and two crops yearly are usually obtained, whilst wheat, maize and beans, cotton, indigo and kola nuts are also important crops. Cotton has long been grown by the natives, and in British Nigeria attempts are being made to encourage natives to grow it for export to Lancashire. In the wetter south, ground nuts, shea nuts, yams, palm oil and rubber indicate the approach of equatorial forest conditions.

The only native manufactures of importance are those of leather and cotton. These are of sufficient extent to provide one of the chief reasons for the caravan trade across the Sahara. The home-grown indigo is used for dyeing the cotton cloths, which find a ready sale in all parts of the Sudan.

The Sudan may be subdivided into :—

- (i) The Anglo-Egyptian, or Eastern Sudan.
- (ii) The Lake Chad Basin, or Central Sudan.
- (iii) The Middle and Upper Niger and the Senegal and Gambia Basins, or Western Sudan.

Of these units the first has been dealt with already, owing to its close connection with the Nile.

The Central Sudan is the basin of Lake Chad, a shallow, marshy, fresh-water lake much studded by islands. It is the centre of a continental basin or inland drainage system, for the rivers which flow into it, the chief is the Shari, do not reach the open ocean. To the north of the sandhills, fringing its northern shores, lies a poor type of grassland producing little of importance besides gums. On its southern margins are extensive swamps and forests which give way to rich pastoral and agricultural lands where all the typical Sudan crops are raised. *Kuka*, near the western borders of the lake, is an important Nigerian market town and centre of caravan routes from Tripoli and Kano.

Western Sudan includes the middle and upper basins of the Niger, as well as the basins of the Senegal and Gambia rivers. The middle Niger basin is the highest and most productive part of Western Sudan. It is

inhabited by tribes who long ago reached a relatively high standard of civilization. There are two principal tribes, the Hausas and the Fulas. The Hausas, who are of excellent physique, usually live settled lives and follow agricultural pursuits. The Fulas, of mixed Hamitic and negro origin, are pastoral people. Many live amongst the Hausas, whom they conquered in the eighteenth century.

The chief towns lie on the fertile elevated lands away from the rivers, where the climate is often very unhealthy and the tsetse fly abounds. *Sokoto*, built of mud huts and surrounded by a wall about forty feet high, is the chief centre of Mohammedanism in Western Sudan. *Kano* has for centuries been a great market and caravan centre. It is noted for its native manufactures of pottery, metal, leather and cotton. Kano is now in direct communication with Lagos by means of a railway which crosses the Niger above Rabba. *Timbuktu*, the fortified capital of French Sudan, is the point upon which caravan routes from Morocco, Algeria and Tripoli converge, and is a great trading market for desert, savannah and tropical forest products. Situated about nine miles from the Niger, it is connected with that river by a channel which is only navigable during the flood season. Timbuktu can now be reached by a rail and water route from the west coast (see Fig. 135).

The Senegal passes through a poor grassland, a transitional type between desert and true savannah, whose chief product is oil, obtained from the seeds of sesame, a herb which thrives in dry regions, and from ground or pea nuts. *St. Louis*, on an island in a lagoon at the mouth of the Senegal, is the capital of French Senegal, the old colony from which French influence in the Sudan spread eastwards towards the Niger. The lagoon is difficult to enter, especially in stormy weather, so that the port of St. Louis is being superseded by *Dakar*, sheltered by Cape Verde.

The lower valley of the Gambia forms British Gambia, whose capital, *Bathurst*, has a good harbour on the southern bank of the Gambia estuary.

UPPER GUINEA.

PHYSICAL FEATURES AND CLIMATE.

Upper Guinea rises from a very low, narrow, sandy coastal plain to the highlands which act as the watershed between those rivers flowing to the Niger and those flowing to the Guinea Coast (see Fig. 134). Although many of the latter rivers are navigable to the base of the highlands for small boats, the only river of any importance for transport is the Volta, for the rivers of Upper Guinea suffer from the great disadvantage of discharging their waters into lagoons cut off from the



FIG. 134.—Upper Guinea.

sea by sandbars which form one of the most prominent features of the Guinea Coast. The approach to the coast is exceedingly difficult, for a long white wall of surf is continuously thundering against the sandbars, making it extremely dangerous for ships to approach. Thus it is that from Freetown to Lagos there is no good landing-place, and ships have to anchor about a mile from the bars. This means that passengers and cargo must be landed in surf boats, a procedure of great inconvenience and of no inconsiderable danger.

Owing to the nearness of the region to the equator, the temperature is uniformly high at all seasons, but

the range exceeds that of regions nearer the equator. The coastal belt has rain at all seasons, but further inland the fall is more restricted to the summer season. Even in the wetter coast belt there is a marked wet season in summer, and a marked relatively dry season in winter, if the terms "summer" and "winter" can be correctly applied to these tropical lands.

NATURAL VEGETATION AND CHIEF PRODUCTS.

The Upper Guinea lowlands are equatorial forests. The coastal margins and the deltas of the rivers are overgrown with mangroves. Further inland, the forests are denser, and the tangled mass of trees and creepers resemble the forests of the Congo basin. When the plateau is reached, savannahs with permanent pastures are encountered, while still further inland are the grasslands of the rainy season only. The natural products of the lowlands are rubber, which is widespread; the oil palm, found chiefly in the east; ground nuts, more important in the west; cabinet woods (mahogany and ebony) and yams. Further inland, important cultivated crops—cotton, cacao, maize and millet—appear.

Transport is everywhere difficult, and products are brought to the harbourless and surf-beaten coast only with considerable difficulty, although there are now several railways running inland from ports on the coast, whilst in some places, *e.g.* the Gold Coast, good-surfaced roads have been constructed and motor traffic introduced.

THE POLITICAL PARTITION.

British Territories.—Britain has three very important possessions along this coast. *Sierra Leone* was first used for the settlement of freed, escaped or rescued negro slaves, hence the name of the only important city, *Freetown*. This port has the most sheltered harbour on the Guinea Coast, but its climate is very unhealthy. It was to this district that the name "White Man's Grave" was given.

Gold Coast.—The coastlands and southern Ashanti are forested, whilst northern Ashanti and the Northern Territories are savannahs. In the first region the chief products are cacao, rubber, palm kernels and oil. The yield of the palm kernels and oil has decreased, owing to the greater attention which has been given in recent years to the cultivation of cacao, now the chief product. Mahogany is floated down the rivers from the forests to the coast, and forms the most valuable timber of the region, whilst gold, obtained partly by dredging and partly by mining, ranks next to cacao in order of value.

The interior savannahs repeat the conditions already studied in connection with the Sudan. This part of the country may become important for the production of cotton; some is already grown, but the immediate need is the improvement of means of communication between the interior and the coast. There are at present two railways, one from Sekondi to Kumasi, the Ashanti capital, and another running inland from *Accra*, the capital of the colony. It is proposed to join the two.

Nigeria, the most important British West African possession, comprises a number of territories formerly under separate administrations. The forested coastal plains, which in Nigeria are broader than elsewhere on the Guinea Coast, produce all the typical commodities of equatorial forest regions. The savannahs of northern Nigeria were considered on pp. 487-8.

Nigeria has valuable mineral deposits which will be of greater importance in the future than they are to-day. A tin-bearing area, some 9,000 sq. miles in extent, and producing ores yielding a high percentage of metallic tin, has been located in the Bauchi plateau, south of Kano. Silver, lead, iron and coal are also found. The natives have worked lead, iron and tin for centuries. Communication with the interior is maintained by the railway from Lagos to Kano, by the great water highway of the Niger, and by a government controlled system of land transport by pack and draft animals using the many well-made roads. The projected railway from *Port Harcourt*, a new port on the Bonny River, to the Udi

coalfields and thence to the Benue River and along the edge of the Bauchi plateau to the existing railway will be a most valuable trunk line. The Niger, whose swampy, very unhealthy delta stretches for 250 miles along the coast and covers an area of some 14,000 sq. miles (that is, nearly twice the size of Wales), is navigable for the shallow-draught Niger boats as far as Rabba, above which the navigation is interrupted by rapids. The headquarters of the steamboats navigating the river are at *Lagos*, the chief town and port of Nigeria. The town is built on an island in a lagoon, separated from the sea by a bar. A mole is being built and a deep channel cut through the surf-beaten bar, so that large vessels can be admitted to the harbour.

French Territories.—Except in Nigeria, most of the Sudan hinterland of the Guinea lowlands belongs to France. The French lands reach the coast in Senegal, in French Guinea, in the Ivory Coast, and in Dahomey. The climate and products repeat those of the other Guinea coastlands.

Other Upper Guinea territories are *Portuguese Guinea*, west of French Guinea, and *Liberia*, east of Sierra Leone. The negro Liberian Republic, with a constitution modelled on that of the United States of America, had its origin in the efforts of several European and American colonization societies to make provision for the settlement of freed American slaves, but of a total population estimated variously at from one and a half millions to two millions, only about 12,000 are American-Liberians. The economic development of the country can scarcely be said to have begun.

The former German Colony of Togoland has been divided between the British Gold Coast Colony and French Dahomey, to be administered under a mandate from the League of Nations.

LOWER GUINEA.

Lower Guinea, stretching along the west coast of Africa from the Niger to the Cunene, repeats many of

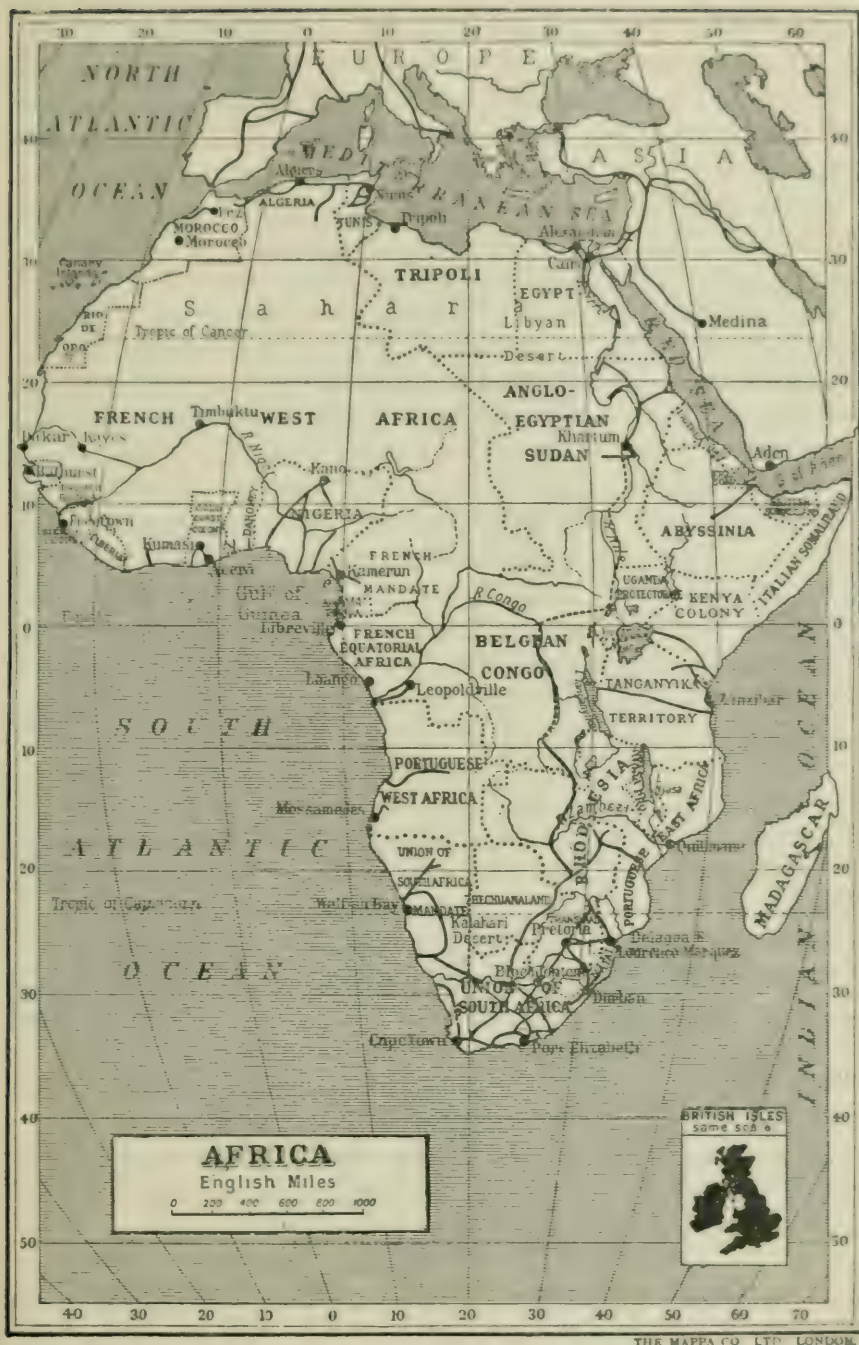


FIG. 135.—Political boundaries of Africa.

the features of Upper Guinea. In the north, where the coast turns southwards, the Kamerun volcanic group reaches, in the extinct volcano of Kamerun Peak, an elevation of 13,000 feet. The rainfall is heavier north of the mouth of the Congo than to the south, and heavier on the coastal plains and the plateau scarp than on the interior plateau. The coastal plains are thus equatorial forest, except in the south, whilst the interior lands are largely savannahs. The volcanic islands, Fernando Po (Spanish), Prince's Island and St. Thomas (Portuguese), and Annobon (Spanish), continue the direction of the Kamerun highlands. Of these, St. Thomas, which produces fifteen per cent. of the world's output of cacao, is the most productive.

French Equatorial Africa.—This vast territory includes the greater part of the former German colony of Kamerun, the smaller portion being added to British Nigeria. The interior savannah lands have been very little developed, but the coast lands yield the same valuable products as the coast lands of Upper Guinea, *i.e.* palm kernels, oil, rubber, ivory, cacao, etc. The chief ports are Duala and Libreville.

Rio Muni is a small Spanish possession surrounded on all sides except the west by Kamerun. It has no good harbours and its rivers are inaccessible to shipping.

Portuguese Angola comprises three natural regions. The first is that part of the north which is contained within the Congo basin, the second the high plateau of the south, and the third the coastal plain which narrows towards the south. The Congo basin region is equatorial forest, the high plateau a savannah land passing gradually into semi-desert towards the south, whilst the coastal plains and the adjacent parts of the plateau pass rapidly from equatorial forest in the north to arid desert in the centre and south. The economic development of all three is in a very backward state.

The chief towns are on the coast. *San Paulo de Loanda* is the capital and chief port. Other important harbours are *Benguela* and *Mossamedes*. From Loanda

and Benguela railways run eastwards into the interior, that from Benguela (actually commences at Lobita Bay) being destined to reach the Katanga copper-mining district of the southern Belgian Congo.

THE CONGO BASIN.

PHYSICAL FEATURES AND CLIMATE.

The Congo basin is a roughly circular plateau, the central part being about 1,500 feet above sea-level, and surrounded on all sides by a higher plateau (see Fig. 136). The greater part of the basin is thus a depression which not improbably represents the bed of a former inland lake or sea of vast proportions, of which Lakes Leopold II and Tumba are small remnants. It is probable that the draining of this former lake commenced when the river breached the plateau margin of the Guinea Coast and poured off the water to the Atlantic. The head-streams of the Congo are the Lualaba and the Luapula, the latter from Lake Bangweolo. Below the confluence of the Lualaba and the Luapula, the Congo receives a tributary which drains Lake Tanganyika, when the level of the water of that lake stands sufficiently high. From this point the river, here about a mile wide, is navigable to the equator, where the famous Stanley Falls impede navigation for over fifty miles. These are situated where the river leaves the eastern plateau for the lower central plateau, and form a complete barrier to water-borne traffic. The direction of the river now changes and becomes westward, and further on south-westward, until it swells out into the lake-like expansion of Stanley Pool before it plunges down the terraces of the Guinea plateau by a series of falls and rapids known as the Livingstone Falls. The chief tributary is the Ubanghi, whose headstream, the Welle, rises very close to the Nile. Most of the left bank tributaries are collected by the Kasai, which receives the drainage of Lake Leopold II.

The climate is very equable and hot at all seasons. The rainfall is less on the coast than in the interior, where the mean annual rainfall over the greater part of the basin exceeds 60 inches. In most places the rain falls at all seasons, but each part of the basin has two well-marked rainy periods which coincide with, or immediately follow, the passage of the heat and

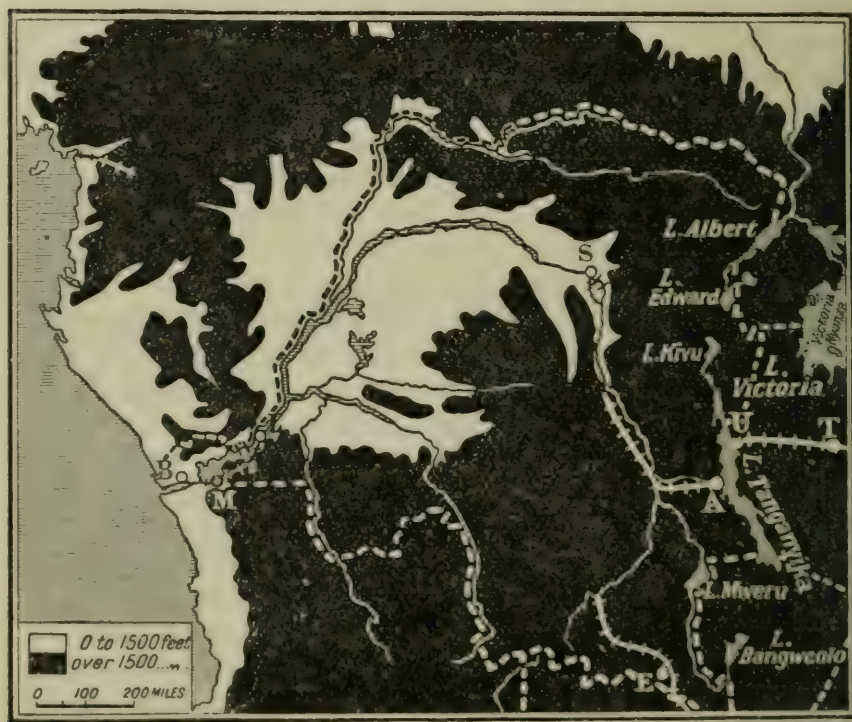


FIG. 136.—The Congo Basin.

pressure belts as they migrate with the sun. Thus, on the equator, *e.g.* at Equatorville, the wettest periods occur about the equinoxes.

NATURAL VEGETATION AND CHIEF PRODUCTS.

The heat, combined with the constantly moist atmosphere, gives hot-house conditions which result in the prevailing vegetation being equatorial forest.

The most important product of the Congo basin is rubber, obtained from many kinds of plants and trees. There are many large areas of untouched forest, but their development must await the provision of better means of communication. Palm oil, palm kernels, copal and ivory, the latter obtained from the large herds of elephants found in the basin, are also leading products, whilst rare cabinet woods will enter more into future trade than they do at the present time, as also will cacao, cotton, tobacco, etc. Experiments in the cultivation of the last-mentioned products are being made, and there is little doubt that the future will see the clearings of equatorial forests—both in Africa and elsewhere—producing a wide range of cultivated products. Many of the natives cultivate bananas, yams, maize, manioc, etc.

The Congo basin has also considerable mineral wealth, especially copper and gold. Most of the mining for these minerals is carried on in the Katanga district, in the south-east of Belgian Congo. The chief centre, Elizabethville, is connected by rail with the "Cape to Cairo" Railway at Broken Hill.

THE CONGO INHABITANTS.

Most of the Congo natives are negroes who speak various dialects of the Bantu group of languages. They are usually of shorter stature than the Sudan negro, and their skins are not quite so black. In the densest, and therefore least accessible, parts of the forest there are very small people known as Pygmies, whose average stature is only four feet three inches to four feet six inches. Some of the Pygmies are engaged in primitive agriculture, but many are savages, obtaining the means of sustenance either by hunting with poisoned arrows or by gathering such berries or edible forest produce as grows wild.

The density of the population in the Congo basin is about equal to that of the Atlas region, and far exceeds that in the Amazon basin. Formerly the population

was greater, but Arab slave raids, once carried on extensively in connection with the ivory trade between the East African Coast and the Congo, did much to reduce it. The Arabs raided Congo villages in order to obtain carriers for ivory, and on reaching the coast sold the unfortunate negroes into slavery.

Belgian Congo.—A large part of the Congo basin forms the only Belgian colony. When Stanley made his great journey along the Congo, his expedition was financed by Leopold II. As a result, treaties were concluded, first with natives, and later with other European states, by which the area was made into a single state under the control of Leopold, who fulfilled his promise to expel the Arab slave-traders, but did not keep his pledge to keep the trade of the Congo open to all nations. In reality the Congo Free State became a great private rubber-producing estate, and horrible atrocities were committed by the agents of the rubber companies. As the result of strong public opinion, the State was annexed to Belgium in 1908, and since that time atrocities have ceased. It has since been enlarged by the addition of a piece of territory in the north-western part of the former German Colony of East Africa.

The capital is *Leopoldville*, on Stanley Pool, and the chief ports are Banana, Boma and Matadi.

THE PLATEAU OF THE GREAT LAKES.

PHYSICAL FEATURES AND CLIMATE.

This region is a portion of the high plateau belt, stretching in a south-west to north-easterly direction from south-west Africa to the Red Sea. It consists largely of great sheets of old, very hard, crystalline rocks, through which volcanic materials have been forced, so that there are extensive sheets of lava, above which tower a lofty but extinct series of volcanoes, with peaks attaining an altitude of 14,000 feet in Mount Elgon, 17,000 feet in Mount Kenya, and 19,300 feet in Kilimanjaro. These volcanoes lie along the margins of

the more easterly of the great rift valleys which form a notable feature of the East African plateau (see Fig. 125). It should be noted that Lakes Victoria, Mweru and Bangweolo are not rift valley lakes, but occupy depressions in the general level of the plateau.



FIG. 137.—The East African Plateau.

On the east the plateau descends to a low, unhealthy, coastal plain, varying in width from a few miles at Mombasa in the centre, to about one hundred and fifty miles near the mouth of the Jub in the north. On the west it descends from the highlands of the western rift valley to the lower plateau of the Congo basin.

The temperature conditions on the plateau may be described as very warm at all seasons. On the coastal plains it is hot at all seasons. This equable distribution of temperature is in both cases due to nearness to the equator, whilst the higher temperature on the plains is due to the lower altitude. As regards rainfall, the plains have a much heavier rainfall than the plateau, and there is a marked increase in the amount as one goes from north to south. The coastal plains receive rains at all seasons, but most falls in summer. This seasonal distribution of rainfall is also true of the Lake Victoria region. Between these two regions the rainfall occurs almost entirely in summer, winter and spring being exceedingly dry.

NATURAL VEGETATION AND CHIEF PRODUCTS.

These climatic conditions produce two main types of vegetation, the equatorial forests of the coastal margins and the savannahs of the plateau. In the drier, eastern parts of the plateau, the prevailing landscape often assumes that of a scrubland, consisting of stretches of poor grassland with patches of thorny, gum-yielding bushes and trees. On the hot, unhealthy coastal plains, which may be compared with those in similar latitudes on the west coast, tropical products such as rubber, rice, yams, bananas, spices, sisal hemp, etc., are cultivated. The coast is often fringed with mangrove swamps, whilst coconut palms are very common. The bark of the mangrove is utilized in tanning, and the dried kernel of the coconut, known as copra, is made into soap and candles.

On the plateau, settlement is confined chiefly to the uplands, for the lower scrub regions are not suitable, owing to the infertility of the crystalline rocks, to the dryness, and to the presence of animal pests such as the tsetse fly. But these scrublands are great big-game hunting-grounds, and abound in antelopes, zebras, lions and other wild animals, whilst the tsetse fly-infested river valleys are the homes of the elephant, the rhino-

ceros and the hippopotamus. On the uplands the volcanic soils are exceedingly fertile and rich pasturelands are found, whilst the best parts are utilized for agricultural purposes. The Masai, a fine, stalwart race of mixed Hamitic (white) and negro blood, are the aristocracy of the native inhabitants. They are pastoral nomads, who rear cattle, goats and sheep, whose chief foods are milk and meat, and whose dwellings are usually made of skins stretched on a framework of poles. In former days they frequently raided the more settled agricultural communities of the wetter uplands. In the latter districts cotton, tea, coffee and other crops are now being cultivated under the supervision of Europeans. In the Lake Victoria area the banana grows profusely and forms the chief article of food, whilst the tree itself is put to a great variety of uses by the natives. The same is true of the coconut palm of the coastlands.

THE POLITICAL UNITS OF EAST AFRICA.

Uganda and Kenya Colony.—Kenya Colony (British) has the two natural regions already noted, the equatorial lowlands of the coastal plain, and the scrub and savannah lands of the plateau.

The chief means of communication is the Uganda State Railway, which runs from *Mombasa* to Port Florence on Lake Victoria. Mombasa, whose harbour is one of the best on the East African coast, is on a coral island which is connected with the mainland by a bridge. The Uganda Railway has to surmount very steep gradients, not only in attaining the level of the plateau, but in negotiating the steep scarps of the eastern rift valley. Just before reaching the higher western parts of the plateau, where the railway is over 8,000 feet above sea-level, the line passes through *Nairobi*, the capital. On Lake Victoria regular steamship services are maintained, the most important being that between Port Florence and Entebbe, the administrative centre of Uganda. Formerly the islands on Lake Victoria were populated, but they have been

deserted, owing to the terrible scourge, sleeping sickness, which has also been responsible for the depopulation of whole areas in Uganda.

Tanganyika Territory.—The relief, climate, vegetation and natural regions of this former German colony, whose government has been confided to Britain, resemble those of Kenya Colony. The capital and chief port is *Dar-es-Salaam*, situated at a gap in the coral reef which fringes the coast. From this port a railway, which may be compared with the Uganda Railway, runs via *Tabora* to *Kigoma*, near to *Ujiji*, on the shores of Lake Tanganyika. This line carries eastwards the products of the different belts through which it passes, as well as those of eastern Belgian Congo. It is superseding the extensive caravan trade which formerly followed this route.

The Zanzibar Protectorate.—This British Protectorate is of considerable historic interest, for, as a centre of Arab power, it dominated the trade of East Africa for very many years. It has the great advantage of being a very fertile and healthy island, facing a most unhealthy coast. In modern times, although it is still the most important East African port, its importance and its population have declined, largely owing to the rivalry of Mombasa and *Dar-es-Salaam*, both of which have now modern means of communicating with the interior. It has still a great entrepôt trade, as is shown by the fact that cotton cloth, rice, ivory, provisions and petroleum figure both as important exports and imports. The chief product of the islands of Zanzibar and Pemba is the clove, the flower-bud of a shrub. The bulk of the world's supply of cloves is exported from these two islands. The port of Zanzibar is built on the sheltered west coast, facing the mainland.

Northern Rhodesia and the Nyasaland Protectorate.—These British possessions occupy the southern portion of the Great Lakes Plateau. The bulk of the inhabitants are found in the higher parts of the plateau, *e.g.* the Shiré Highlands, away from the tsetse fly-infested river lowlands. It is still uncertain whether these up-

land areas can be successfully colonized by Europeans, but settlements of British planters, largely Scotch, have existed in the Nyasaland uplands for many years. Pastoral occupations are, however, more prevalent than agriculture, and in many areas the planting of English grass seed has led to a great improvement in the suitability of the grass for cattle food. Both cattle and maize find a ready market in the Katanga mining district of south-eastern Belgian Congo.

Minerals are known to exist in both Northern Rhodesia and Nyasaland, but at present the amount of mining is comparatively small. At *Broken Hill*, on the "Cape to Cairo" Railway, lead and zinc are mined.

Northern Rhodesia and Nyasaland, in common with the whole of British Central Africa, have suffered from the disadvantage of having no easy outlet to the sea in British territory, except towards the south. Northern Rhodesia is brought in contact with Southern Rhodesia and British South Africa by the "Cape to Cairo" Railway. The natural outlet of Nyasaland is along the valley of the Shiré to the Zambezi, whose mouth is in Portuguese territory, but the Portuguese have given the British Government a concession of land at Chinde, on the only navigable distributary, where goods in transit for British Central Africa are free of Customs Duty.

The administrative centre of Northern Rhodesia is *Livingstone*, situated near the Victoria Falls, at the point where the railway crosses the Zambezi. *Zomba* is the administrative centre of Nyasaland, but *Blantyre* is the most important settlement.

Northern Mozambique.—That part of Portuguese East Africa lying north of the Zambezi and south of the Rovuma repeats the two physical units of the regions already studied, but with certain important modifications. The coastal plains are much broader, and the plateau is, on the whole, lower. The climate is that of a hot monsoon type, and bears close resemblance to the climates of the North Australia and South China coastlands. The natural vegetation and products resemble those of Tanganyika Territory, although the forests of

the coastal belt are not so dense, but the economic development of the country is in a very backward condition.

The chief port is *Mozambique*, built on a coral island at the narrowest part of the Mozambique Channel.



FIG. 138.—Physical map of South Africa.

SOUTH AFRICA.

PHYSICAL FEATURES.

Africa south of the Zambezi consists of high plateaus built up of nearly horizontal layers of rock. Except in Portuguese East Africa the coastal plains are everywhere very narrow, whilst the only portions of the plateau which are under 3,000 feet above sea-level are the river valleys (see Fig. 138). In the extreme south-west (see Fig. 75) there are highlands which do not form part of the plateau. They are ancient folded ranges running in an east and west direction parallel to the edges of the plateau. They are much older than the folded Atlas ranges of North-West Africa, and appear to have been worn down to a peneplain and afterwards to

have undergone uplift, so that the softer rocks have been worn away, leaving the hard rocks standing as ridges, of which the Zwartebergen and Langebergen are examples.

The plateau descends to the coastal plains by a series of well-marked terraces. Looked at from below, the edges of the terraces look like mountains, but from above the edges are approached by gentle slopes. The highest forms what may be called the rim of the plateau (see Fig. 139), and it is characteristic of South Africa that this rim stands higher than the general plateau level.

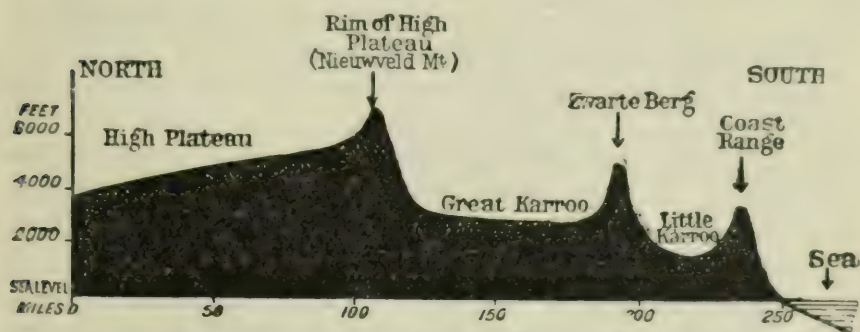


FIG. 139.—Diagrammatic section from the Orange River to Mossel Bay.

CLIMATE.

The northern portion of South Africa is within the Tropics, and no part lies farther than 35° from the equator, but temperature is almost everywhere modified by altitude. The greater part lies in the track of the south-east trades at all seasons. In summer the whole area receives these winds, for the southerly migration of the pressure belts causes the westerlies to blow south of the continent. Since it is also in summer that low-pressure conditions prevail over the interior plateau, it is during this season that the inflowing south-east trades not only bring most rain to the east coast, but also penetrate beyond the rim of the plateau, and bring rain to the plateau itself. But, of course, the amount of rain diminishes as the west

coast is approached, with the result that except in the higher parts of the plateau, the west coast is so dry that desert conditions prevail, for the south-east trades cannot bring winter rains, except to the east coast margins. They are unable to do this, since in winter the air moving outwards from over the cooled plateau prevents the trade winds from crossing the rim of the plateau. Therefore the winter rains brought to the east coast by the south-east trades are confined to the coastal margins. But the south-west corner, the Cape Town region, receives winter rain from the westerlies, which at this season blow farther north owing to the migration of the heat and pressure belts into the northern hemisphere.

Although on the whole the greater part of South Africa is very dry, it is much better watered than the trade-wind belt of North Africa. The reasons for this are: (i) the greater elevation and narrowing of the continent; (ii) the presence of a large ocean to the east, instead of, as in North Africa, the landmass of south-west Asia, so that the winds pass over ocean waters before encountering the land. It is for these reasons that the Kalahari desert is restricted to the west coast, whilst the Sahara stretches right across the continent.

NATURAL VEGETATION.

The various types of natural vegetation and vegetable products in Africa south of the Zambezi are closely related to the climatic conditions. The chief forested regions are in the east and south-east, where the rainfall is sufficient for the growth of tropical forests in the north and warm temperate forests in the south. There are also forests of the Mediterranean evergreen type in the south-west, where most rain falls in winter. Proceeding from east to west, the eastern parts of the high plateau have sufficient summer rain for the growth of grasses but not for tree growth. Thus, in the middle Zambezi and Limpopo basins the prevailing vegetation is savannah, whilst farther south the increased elevation and greater distance from the equator cause the grasslands or veld

to be of a temperate type. Farther west, the middle and lower Orange basin, the eastern parts of South-west Africa and Bechuanaland form a transition semi-desert area, which gradually merges into true desert as the coastal margins are approached.

POLITICAL DIVISIONS OF AFRICA, SOUTH OF THE ZAMBEZI.

(I) THE UNION OF SOUTH AFRICA.

The Cape of Good Hope.—The province contains the following natural regions :

- (a) A "Mediterranean" region in the south-west.
- (b) An eastern warm temperate region in the south-east.
- (c) The Karroos, forming the steps to the High Veld.
- (d) A high veld region in the north-east.
- (e) A semi-desert region in the north-west.

Most of the people live in the first two regions, and least in the last. The principal crops are maize and tobacco (in the south-east region of summer rain), wheat and oats (chiefly in the south-west), and the fodder plant lucerne (grown for ostriches on the Little Karroo). Many millions of gallons of wine are made every year in the "Mediterranean" area, whilst tremendous numbers of cattle, sheep, horses and ostriches are reared on the pastoral lands. The products from the latter (wool, hides, skins, mohair and ostrich feathers) are the chief exports of the province. Diamonds form the most valuable export, but of course from the point of view of the number of men employed in the industry it does not rank first. The diamonds are chiefly mined in the district of Kimberley, where the industry is in the hands of the famous De Beers Company.

The capital of the province is *Cape Town*, which owes its great importance as a port to the fact that it is a half-way house at the southern extremity of a land which has to be rounded by those vessels using the Cape Route and trading between the North Atlantic ports on

the one hand, and those of India, the Far East and Australasia on the other. As a port it has greatly increased in importance owing to the improved means of communication with the interior.

Other ports are *Port Elizabeth* and *East London*. The former stands on Algoa Bay, a fairly good harbour, but unfortunately exposed to the full force of summer, south-east gales. Its hinterland comprises the eastern Great and Little Karroos, with both of which it is in



FIG. 140.—Political map of South Africa.

communication by rail, as well as with the High Veld and Cape Town. East London has a rather poor harbour, made by the dredging of the mouth of the small Buffalo River. *Port Nolloth*, south of the mouth of the Orange, exports the copper mined in the Ookiep area.

Of the interior towns *Graaff Reinet*, a great wool-collecting centre, in the eastern part of the Great Karroo, and *Kimberley*, the centre of the great diamond-mining area lying between the Vaal and its tributary the Modder, are the chief.

Natal.—This province may be divided into—

(a) The hot coastal plain.

(b) A middle agricultural belt.

(c) The highlands of the Drakensbergs.

The coastal belt produces sugar, sub-tropical fruits, such as bananas and pineapples, and tea. The tea is grown on the hills near the coast. It is here that the Indian coolies live. They have been introduced as being more satisfactory for plantation work than the native Kaffirs, and are largely employed in the cultivation of the products just mentioned.

In the middle belt, which includes the terraces between the coastal plain and the Drakensbergs, farming of a different type is carried on. Many cattle and sheep are reared and much wool is exported. Maize, Kaffir corn, wheat and tobacco are grown. The cultivation of wattles is very important. The bark is used in tanning, an important industry in a land where large numbers of cattle are reared, whilst the trunks find a ready market for use as props in the Rand gold-mines. It is in the middle belt that the important Dundee-Newcastle Coalfield is situated.

In the highland area, pastoral occupations are of prime importance, and as Natal has some rain even in winter when the High Veld is almost rainless, many Transvaal and Orange Free State farmers drive their cattle and sheep to this area during the winter months. The rainfall is heavy enough for extensive forests, from which valuable timber is obtained, a boon which is not widespread in South Africa, where dry conditions prevail over the whole of the centre and west.

The administrative centre of Natal is *Pietermaritzburg*, or *Maritzburg*, in the middle belt. The largest town and chief port is *Durban*, whose harbour is almost landlocked. This port is nearer to Johannesburg and other Rand mining centres than any other British South African port (*cf.* the Portuguese port of Lourenço Marques), and as it has also direct communication with those places, as well as with the Orange Free State, it has a great transit trade, especially in gold and wool.

It exports the coal, wool, hides and sugar which form the leading exports of those articles produced within the province. It is also a whaling centre of considerable importance.

Orange Free State.—This small province is entirely *high veld* and is, therefore, largely pastoral, except in the wetter east, where agriculture is possible, especially in the valley of the Caledon, where much wheat and oats are grown. Maize, however, is the chief crop, and is largely grown in the east and north-east. In the west the diamond mines of the Kimberley district are continued into the Orange Free State, and *Jagersfontein* is an important centre.

Bloemfontein, the largest town and administrative centre, is centrally placed and enjoys good railway facilities. (See Fig. 140.)

The Transvaal.—"The land beyond the Vaal" may be divided into three distinct physical units. These are—

- (a) The plateau.
- (b) The plateau slopes (the *banken*).
- (c) The low or bush veld.

The plateau may be subdivided into two portions, the High Veld and the Middle Veld. The High Veld is chiefly in the south-east, where an average elevation of over 5,000 feet is attained. It consists of vast, rolling, grassy steppes where two-thirds of the cattle, sheep, goats and horses of the province are pastured. The Middle Veld has an elevation of from 4,000 to 5,000 feet above sea-level, and has a more diversified surface than the High Veld. It is especially marked by the occurrence of long, bare, stony ridges, called "rands." The best known is the Witwatersrand, on the east of which lies Johannesburg, the great gold-mining centre. The Middle Veld is not so good for stock-rearing as the High Veld, for the grass is poorer, and the animals eating it are more subject to disease.

The plateau slopes, or *banken*, are more suitable for agriculture than for stock-rearing, e.g. Pretoria, on the

slopes of the High Veld, is situated in an agricultural area producing maize, wheat, tobacco and fruits.

The Low or Bush Veld covers about two-fifths of the whole country. If the summers were not hot and unhealthy, and if the Low Veld were not infested by the tsetse fly, the southern portion could be used for the cultivation of sago, coffee, tobacco and similar crops, whilst the best portions of the north could support large numbers of cattle. As it is, the pasture-lands are quite unsuitable for cattle, except in winter.

The administrative centre of the Transvaal, as well as of the whole Union of South Africa, is *Pretoria*, but the largest and richest town is *Johannesburg*. This city is also a great railway centre, in many respects the chief in South Africa (see Fig. 140). The natural outlet of the Transvaal is through Lourenço Marques, the Portuguese port on Delagoa Bay. The nearest British port is Durban, but as most of the trade of the great mining centre is carried on with England, and as the chief exports of the Transvaal are such articles as will bear the heavy rail charges, a very considerable portion finds an outlet through Cape Town, the nearest port to England. The line to Lourenço Marques passes through an important coal-mining area, of which the largest centre is *Middelburg*.

South-West Africa.—The coastlands and that part of the country south of Walfish Bay are desert lands, but towards the centre pastoral farming is possible, whilst in the north-east, where there is a fair rainfall, it is even possible to cultivate cereals and lucerne, the deep-striking fodder plant. But it was the mineral wealth of South-West Africa which led Europeans to exploit it. It is rich in diamonds and copper. The former are found along the coastal margins south of Walfish Bay, the latter in the northern districts. The best harbour is *Walfish Bay*, but *Swakopmund*, just north of it, was more important during the years that South-West Africa belonged to Germany. From this roadstead one railway runs to *Windhoek*, and then traverses the central pastoral belt, sending a branch to

the chief diamond region along the coast. Another line runs to the northern copper mines (see Fig. 140).

South-West Africa is administered by the Union of South Africa under a mandate from the League of Nations.

(2) OTHER SOUTH-AFRICAN STATES.

Swaziland.—This little British Possession is situated at the south-east corner of the Transvaal. Physically it is a low plateau and forms part of the Low Veld. It does not form part of the Union of South Africa, but is governed by native chiefs who are under the final jurisdiction of a resident British Commissioner. For customs purposes, however, Swaziland comes under the Union. Both arable and pastoral farming are carried on, and the agricultural and grazing rights of the natives have been carefully guarded. The chief crops are maize, millet and tobacco.

Basutoland.—This British Protectorate, which lies between the Caledon River to the north-west and the Drakensbergs in the south-east, is largely a High Veld land, although its eastern margins are broken by several ranges parallel and subsidiary to the Drakensbergs. The soil is generally fertile, and the rainfall is abundant, so that both arable and pastoral farming are carried on, and the country supports a relatively dense population. It is largely owing to the natural defensive advantages of the country that the Basutos, a warlike native race, were able to withstand the attacks of the Zulus, who conquered and devastated other parts of South Africa. European settlement is prohibited, the only Europeans in the country being engaged in trade or in government or missionary work. The natives produce and export wheat, maize, Kaffir corn, mohair and wool. There are no railways, no navigable rivers, and the largest town, and capital, *Maseru*, is a mere village.

The Bechuanaland Protectorate.—Contains portions of two natural regions. The north-east and east are grasslands, mainly of the savannah type, but the west

is the dry scrubland of the Kalahari desert margins. The inhabitants, who are almost entirely natives, are engaged in the rearing of cattle, and in growing maize and Kaffir corn. Johannesburg is the chief market for Bechuanaland meat, and it is unfortunate that during recent years this and other markets have been closed owing to the spread of disease amongst the cattle. The administrative headquarters are at *Mafeking*, a town near the borders of the Transvaal, but in the Cape of Good Hope district of British Bechuanaland. The Cape Railway passes through the eastern and best part of the protectorate.

Southern Rhodesia.—In this province it is important to emphasize the factor of elevation, for, although situated within the Tropics, a large part of Southern Rhodesia enjoys a climate which may be described as temperate, so that that part of the country above 4,000 feet is fit for white settlement. Maize, Kaffir corn and wheat are grown as well as fruits, such as oranges and lemons. The wheat and Mediterranean fruits are grown in the dry season, which, although winter, is nevertheless sufficiently warm for them to ripen. But stock-rearing is of greater importance in this savannah land than agriculture, and markets are at hand in the mining districts of Katanga (Belgian Congo) and of Rhodesia, whilst the introduction of freezing methods may in the near future see Rhodesian meat sent to far-distant parts of the world.

The most valuable products of Rhodesia are, however, its minerals, especially gold and coal. The former is found in the district traversed by the railway between Buluwayo and Salisbury, the latter in the famous Wanki coalfields which lie south of the Zambezi and east of the Victoria Falls. Other minerals are known to exist, but at present are not mined to any considerable extent, except in the case of iron.

The chief towns are *Salisbury*, the administrative centre, and *Buluwayo*, at the junction of the Cape Railway with a line giving Southern Rhodesia an outlet through the Portuguese port of Beira. More than half

of the Southern Rhodesian imports reach the province via Beira.

Mozambique.—This Portuguese province occupies the coastal margins of Eastern Africa from the mouth of the Rovuma to Natal. The coastal plains are broader than is usual along the African coasts. They are hot, swampy, unhealthy, and forested, but the interior is drier. The part of the province north of the Zambezi has been described already (see p. 503). Its leading features are repeated in the southern part. The districts near the Zambezi grow most of the agricultural products at present exported. Sugar, rubber, coconut palms and sisal fibres are all important plantation products, whilst in other parts mangrove-bark and rubber are collected. The chief ports are *Mozambique* (see p. 504), *Chinde* (see p. 503), *Beira* and *Lourenço Marques*. The last three enjoy considerable transit trade for British Possessions, Chinde for Nyasaland, Beira for Southern Rhodesia, and Lourenço Marques for the Transvaal. Lourenço Marques, on Delagoa Bay, is the administrative centre of the whole province.

AFRICAN ISLANDS.

ATLANTIC ISLANDS.

All the Atlantic islands are of volcanic origin. The Madeira and Canary groups and the islands of the Gulf of Guinea have already been described (see pp. 473 and 494).

The *Cape Verde Islands* lie in the track of the north-east trade winds at all seasons, and are, therefore, drier than the Madeira and Canary groups, but where sufficient water can be obtained Mediterranean fruits can be grown, whilst in addition, coffee, tobacco, maize and millet are also cultivated. Cattle-rearing is carried on, and a considerable number of turtles are caught in the surrounding seas. Porte Grande is a coaling-station for ships. The group belongs to Portugal.

Ascension and *St. Helena* belong to Britain. They

were important coaling-stations before the opening of the Suez Canal deflected much of the Indian and Far Eastern shipping from the Cape route to the Mediterranean and Suez route. They are now used chiefly as Admiralty coaling-stations. St. Helena, on which Napoleon Buonaparte was placed after his defeat at Waterloo, and on which he died, has a population of about 3,500. It is a mountainous, well-watered island, many of whose trees have been destroyed, so that much of the soil has been washed away, leaving bare rock faces. Cattle are reared to supply local needs, and the introduction of flax has led to a lace-making industry, which has been very successful. Both Ascension and St. Helena are important cable-stations.

INDIAN OCEAN ISLANDS.

Of these Socotra, Zanzibar and Pemba have been described already (see pp. 485 and 502).

Madagascar.—This large French island was once joined to the mainland. The separation must have been effected in long-past ages, for many of the large animals of the mainland (lions, elephants, monkeys, etc.) are absent in Madagascar, which in turn has some species (*e.g.* lemurs) which are not found elsewhere. Moreover, the Mozambique Channel, which separates the island from the mainland, is nearly two miles deep.

Physically and climatically Madagascar resembles the East African Plateau. It is a plateau from 3,000 to 5,000 feet in elevation, so tilted that it presents a steep escarpment face to the east, and descends by terraces to a coastal plain on the west. Since the east coast is continuously exposed to the south-east trades, it has rainfall at all seasons, and is covered with dense forests, but the plateau and the western coastal plain are leeward areas where the rainfall decreases towards the west and occurs chiefly in summer.

Tropical forests cover the lowlands, except in the south-west, where it is too dry for their growth, whilst

the plateau is a savannah region. It is, therefore, on the plateau that most of the inhabitants are found.

The chief products of the forest are rubber and tanning bark, although in recent years there has been a marked decrease in the output, whilst on the savannahs cattle-rearing is easily the chief occupation. Rice, the staple article of food, manioc, cotton, cacao, coffee, vanilla and tobacco and all cultivated products. The mineral wealth is believed to be considerable, but comparatively little attention is paid to it at present.

Antananarivo, or Tananarivo, the capital, occupies a central position on the plateau, and is connected with Tamatave, the chief port, by a railway which descends the steep eastern scarp to the coastal plains.

The Mayotta and the Comoro Islands, which lie at the northern entrance of the Mozambique Channel, belong to France. The chief products are vanilla, cacao and sugar.

Réunion, a rugged and mountainous volcanic island lying some 420 miles east of Madagascar, is also French. The soil is very fertile and the chief cultivations are sugar, tapioca, vanilla and coffee. Sugar is easily the most important export, but the exports of this commodity have steadily declined within the last fifty years.

Mauritius.—Like Réunion, Mauritius is of volcanic origin, but it is not nearly so mountainous, so that although it is only three-quarters the size of Réunion, it supports more than twice the population of that island. Two-thirds of the inhabitants are Hindus, who are chiefly engaged in the cultivation of sugar, for which the climate is very suitable. *Port Louis*, the chief port, has a splendid harbour. *Rodriguez*, an island lying 350 miles east of Mauritius, and the *Chagos Islands*, situated about halfway between Rodriguez and Ceylon, are dependencies of Mauritius. The coral atoll of Diego Garcia in the Chagos group is used as a coaling-station. Coconuts and coconut oil form the chief products.

The Seychelles and its dependencies (the chief are the Amirante, Aldabra, and Providence groups) consist

of ninety islands and islets, whose total area is only 156 sq. miles, of which Mahé, the largest, accounts for one-third. The islands are volcanic, and are generally surrounded by coral reefs. The chief exports are copra, coconut oil, vanilla and guano. Mauritius and the Seychelles belong to Britain.

QUESTIONS AND EXERCISES.

1. What are the most striking features of the relief of Africa? How far do they influence other factors in the geography of the continent?

2. Write a detailed account of the facts which emerge by bringing together on one map the climatic factors shown on Fig. 127. What evidence of "the lagging of the seasons" can you find?

3. Give some account of any large-scale African race migration. Show how it was related to geographical conditions. What conditions lead to racial migrations on a large scale?

4. To what extent may the Sahara and not the Mediterranean Sea be described as the real southern boundary of Europe?

5. "Prince Henry's sailors soon reached Cape Bojador, but there was then a long delay. Once Cape Verde was reached, however, interest revived, although it took a turn which delayed further exploration." Give geographical explanations of these statements. Why were Capes Verde and Blanco so called?

6. How far have the various African expeditions of discovery been prompted by motives of trade, conquest, or of pure scientific interests?

7. Compare the Atlas region with Asia Minor in as many ways as possible.

8. Draw a map of the basin of the Nile. Shade the land which is over 300 feet. Mark in blue those rivers which bring down the summer flood waters. Mark the dams and the positions of the chief cities.

9. Analyze the sites of the following cities in such a way as to bring out the importance of geographical factors which have influenced their growth: Cairo, Alexandria, Khartoum. Draw sketch maps to illustrate your answers (see Fig. 71).

10. At what season will (a) the Algerian shotts, (b) Lake Chad, contain most water? Why? Both are centres of inland drainage. What is meant by this statement?

11. Find out what you can of the methods of government adopted by the different European countries possessing colonies on the West African coast. In particular compare the colonial policies of France and Britain.

12. What is meant by the "White Man's Grave"? Discuss the future possibilities for the permanent settlement of Europeans in the Guinea Lands and other parts of tropical Africa.

13. Coral is found on the east of tropical East Africa, but not on the west coast. Why is this? Are similar conditions found in other continents?

14. During the British and Belgian military operations against the ex-German colony of East Africa in 1916-17, the main Belgian forces were compelled to enter enemy territory via Uganda which they entered south of Lake Albert. Give geographical reasons for this.

15. Why does most of South Africa experience summer rains? Which part has most rain at another season? Why? Why does the amount of rainfall decrease from east to west? How does the decreasing rainfall affect natural vegetation?

16. Why is it that gold-mining areas do not support such a dense population as most coal-mining areas? Where are the chief gold-mines in South Africa?

17. What do you think are the mutual relations which should exist between the European overlords on the one hand, and the native races on the other, (a) in those parts of Africa where white men are birds of passage and do not make permanent homes, (b) in those parts where white men can make permanent settlements?

18. Give some account of the problem of germ diseases in Africa.

19. Compare and contrast Africa and South America as regards the leading features in their relief and climate.

PART VIII

AUSTRALASIA

AUSTRALIA.

PHYSICAL FEATURES AND STRUCTURE.

AUSTRALASIA is the name given to Australia and the numerous islands north and east of that island continent. The largest of these islands, not including Australia, are New Guinea and the two large islands of New Zealand, but there are thousands of others, some of which are of considerable size, whilst others are small coral atolls.

Australia lies south of the equator, between the parallels of 10° S. and 40° S., being therefore almost bisected by the Tropic of Capricorn. Its coast-line has very few large inlets, so that in comparison with the size of the continent it is not very long, and in this respect Australia may be compared with Africa and contrasted with Europe. To the north the East Indies form a series of stepping-stones between Australia and Asia; to the east is the island-studded Pacific; in the south the wide belt of the Southern Ocean separates the continent from the Antarctic region, whilst the Indian Ocean washes its western shores. Its isolated position, away from the great highways of trade and discovery during the fifteenth and sixteenth centuries, accounts for its late discovery and development.

Australia consists of three main physical divisions—

1. The eastern highlands.
2. The east-central lowlands
3. The low western plateau.

The eastern highlands are an ancient highland mass which was worn down and then uplifted. The rains and streams have cut into the raised mass and have deeply dissected it. The name "Great Dividing Range" is given to the whole, but the system is known by different names in different parts. The island of Tasmania is a detached portion of the eastern highlands.

The great depression of the central plains stretches from the Gulf of Carpentaria to the south coast, and, except for a belt in the north, is below 600 ft. in elevation, whilst in the region of Lake Eyre, it, is actually below sea-level. Long ago these plains were the bed of a great inland sea. At that time the eastern highlands were much higher and wetter than they are now, and the rivers which flowed from them to the inland sea carried along rock waste, clay and sands, which were spread on the sea floor. Gradually the highlands were lowered by denudation, thus causing the rainfall and the volumes of the river to decrease. It is also believed that the land was raised, so that the bed of the sea was helped to become dry land by this means as well.

Note the Flinders Range which separates the basin of the Murray-Darling from Spencer Gulf and the Gulf of St. Vincent. It overlooks a rift valley which contains Lake Torrens, and the two gulfs just mentioned.

West of the central lowlands is the enormous low plateau of Western Australia. It consists of an ancient block of the earth's crust which has remained undisturbed for ages (see Fig. 75).

One very interesting feature of Australia is the Great Barrier Reef. This reef is composed of coral, and follows roughly the direction of the coast of Queensland for about one thousand two hundred miles. It is built along an ancient coast-line, now represented by the margins of a submarine plateau. (See also p. 552.)

CLIMATE.

Although Australia is an island, we shall not expect the influence of the sea to be felt much beyond the

coastal margins. In the first place, the size and compact shape of the continent must be taken into consideration. Secondly, the highest mountains are along the coasts, this being especially noticeable on the east coast, a fact which is very important, since the prevailing winds of the greater part of the continent are the south-east Trades. Thus, the effect of the relief is to shut off a large part of the continent from rain-bearing winds, and to give the interior a climate over which the sea has little or no moderating influence.

Temperature.—In January, a summer month, only the extreme south-west and south-east coasts have a temperature below 70° F.; the greater part of the continent is above 80° F., whilst there is a large area where the temperature is over 90° F. In July, a winter month, the lower elevation of the sun naturally gives a lower temperature, so that only the northern margins have a temperature higher than 70° F.; the greater part of the continent is between 50° F. and 70° F., and the coolest region is in the south-east (see Figs. 6 and 7).

Winds and Rainfall.—Figs. 9, 10, 14 and 15 show the winds and rainfall for January and July. In the latter month there is a high-pressure area over the land-mass, and from this winds blow northwards and southwards, being deflected to the left by the earth's rotation. Thus the northern part of the continent receives south-east Trade Winds, which bring no rain, except a small amount to the north-east coast. In the south, the prevailing winds are the north-westerlies, which bring rain to the south-west and south-east regions, as well as to Tasmania.

In January there is a well-developed system of low pressure over the north centre. In moving towards this low-pressure system, the south-east Trades are turned from their course, and bring a considerable rainfall to the north-east coastlands, whilst the north and north-west coasts receive moisture from the north-east Trade Winds, which flow towards Australia as north-west monsoon winds, on account of their being deflected to the left on crossing the equator. As in

July, Tasmania has westerly winds, but south-west and south-east Australia are in the high-pressure belt, and receive little rain during this month.

If we consider the January and July maps together, we shall see that, as in Asia, the rain-bearing winds penetrate farther into the continent in summer than in winter. Fig. 141, which shows the seasonal distribution of rainfall, has been built up from maps showing the mean rainfall for each month of the year.

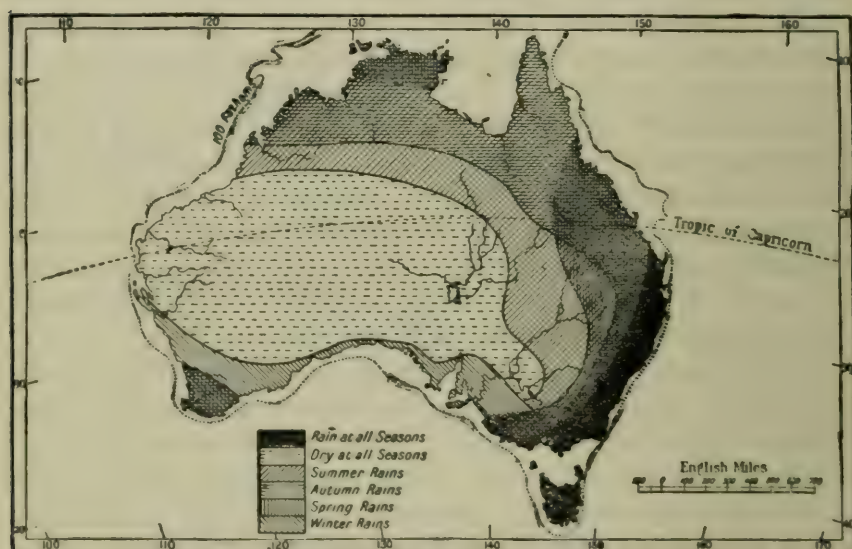


FIG. 141.—The seasonal distribution of rain in Australia.
(After Herbertson and Supan)

DRAINAGE.

Australia has very few important rivers, a fact which is due partly to the relief and partly to the distribution of rainfall. The east coast is the best watered part of the continent, but the mountains lie so close to the coast that the rivers flowing eastwards are all short and swift, and many waterfalls are often found in their courses.

In the north, the central lowlands are drained to the Gulf of Carpentaria by the Flinders and other rivers.

In the south, the rivers gather to make the great Murray-Darling system, whose waters are drained to the Southern Ocean. A great drawback of the rivers of this system is, that the enormous evaporation occurring during the hot weather causes the amount of water they carry to be very small during summer and autumn, but it must be noticed that the Murray rises in the highest part of the Australian Alps, and the melting of the snow helps to keep the supply of water in that river more constant than that of the Darling. Another disadvantage is the very poor mouth. The river flows into Lake Alexandrina, a large lagoon whose outlet to the open sea is not only shallow, but is made of little value owing to the presence of banks of shifting sand. Between the rivers draining into the Gulf of Carpentaria and the Murray-Darling system, there is a great area of inland or continental drainage, in which the rivers flow towards Lake Eyre, which is below sea-level.

From the Gulf of Carpentaria to the Murrumbidgee tributary of the Murray, and including the Lake Eyre basin, there is an *artesian area* composed of permeable layers of rock, *i.e.* layers through which water easily passes, lying on the top of impermeable layers of clays. The basin-shaped structure of the strata causes underground water to collect above the clays. This water can be reached by very deep borings, sometimes nearly a mile in depth, from which it usually gushes without the aid of pumping machinery (see Fig. 142). The importance of such wells in a region of little rainfall is apparent.

In the dry western plateau there are no perennial streams, and what watercourses there are drain into inland lakes, such as Lake Amadeus; but in the monsoon region in the north, and in the "Mediterranean" south-west, perennial streams are found.

PLANTS AND ANIMALS.

The influence of the long separation of Australia from other landmasses is seen in its typical plants and

animals. Much of the continent is so dry that the prevailing forms of vegetation are such as can resist long, dry periods. The eucalyptus, or gum, is the commonest tree. Instead of shedding its leaves, it loses its bark, whilst it gives little shelter from the rays of the sun, as its small, tough leaves stand edgewise. There are many kinds of eucalyptus, ranging from the mallee scrub, which covers a large area of South Australia and New South Wales, to the enormous karri and jarrah species of the south-west. The wood of the latter is of great importance in the construction of railways, etc., in hot, wet countries, as it is so hard

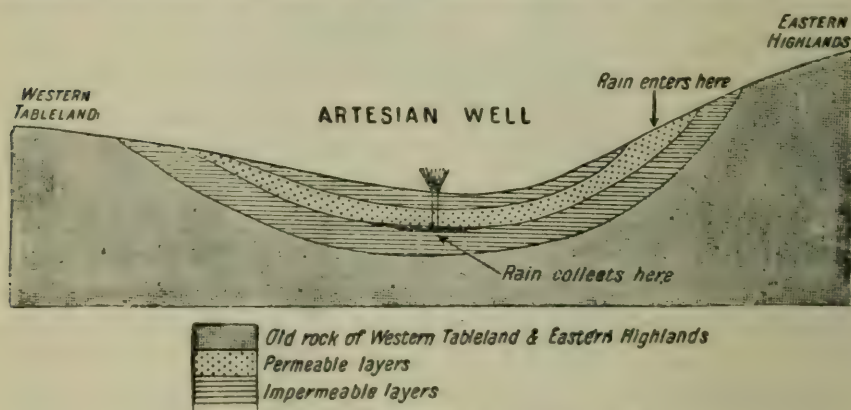


FIG. 142 — Diagram of an artesian well.

that white ants and lice cannot easily destroy it. It is widely used for street paving, and in the construction of docks and harbour works.

As Fig. 18 shows, forested areas are found only in the better watered coastal lands and highlands. Along the north and north-eastern margins are forests of the tropical variety. In the cooler south-east we find a highland region of woodland and grassland. In the former gum trees are commonest, but there are also magnificent tree-ferns and European trees. In the south-west and in south-eastern South Australia and western Victoria (regions receiving rain mainly in winter), the chief trees are the karri and jarrah gums already referred to.

The grasslands may be divided into two kinds, the savannahs or tropical grasslands, and the steppe or temperate grasslands. The former are to be found in the drier belt south of the tropical forests, and the latter in the basin of the Murray-Darling. The native grasses, which are very deep-rooted, and tend to be spiny, have been improved by the introduction of European grasses, as well as by the grazing of animals. Some areas marked on the vegetation map as grasslands, are covered with salt bush and brigalow scrub, or dwarf acacia. The latter is exceedingly difficult to penetrate, but the salt bush is good for sheep.

The dry interior and western areas are either scrublands or deserts. Rain falls only in very small amounts and at uncertain intervals, so that the only vegetation consists of thorny scrub bushes and spiny grasses. The best known of the latter is the spinifex, a tall grass which grows in clumps, and has leaves not unlike a bayonet.

Perhaps the effect of long separation from other land-masses is more clearly shown in the animals than in the plants. The native Australian animals are of a type long since extinct in other continents. Most of them are marsupials, or pouched animals, the best known being the kangaroo, the largest native grass-eating animal. A very strange animal is the platypus, or duck-billed mole, which lays eggs, and after having hatched the young, proceeds to suckle them. In the forested regions are many animals adapted for life in trees. Among these we may name flying squirrels, tree kangaroos, and tree snakes, whilst gaily plumed parrots, parrakeets, and the beautiful lyre birds are also found.

On the grasslands, besides the kangaroo, we find the emu and the cassowary, large running birds resembling the ostrich. Few of the Australian animals are of value, either for their skins or their flesh, and that accounts for their being gradually driven towards the scrub and desert lands, as man extends farther into the continent. This will lead eventually to their disappearance.

Although the common, domesticated animals of Europe were lacking when the continent was discovered, horses, cattle, pigs, and sheep have all been introduced, and thrive very well indeed, increasing in numbers at the expense of the native animals. Rabbits have also been introduced, and owing to the great rate at which they have multiplied, largely due to the absence of such enemies as the fox and the weasel, are now a very serious menace, and have to be kept off the sheep runs or prevented from spreading by means of wire fences.

THE NATIVES OF AUSTRALIA.

The fate of the animals appears likely to be also that of the natives, since there are now only about 75,000 aborigines left, probably about half as many as there were when Europeans first reached the continent. In appearance they are short in stature, their skin is dark brown in colour, their hair is black and wavy, and they usually have a profusion of beard. In advancement they appear to have reached the stone age, for when they were first discovered they were using stone axes. Probably their progress had been retarded by lack of domestic animals, as the dingo, or native dog, was all they had; but the inhospitable nature of the climate of the greater part of the continent, and the consequent hard struggle for existence, must also have had an important influence. The latter cause certainly made a large increase in their numbers impossible. Their occupation is chiefly hunting, a calling in which they have developed marked skill, as is shown by their invention of the boomerang and the throwing-stick. To-day the aborigines are to be found mainly on the scrublands, on the margins of the deserts, and in government reservations.

The aborigines of Tasmania, who were not of the same race as those of Australia, have now no representatives.

BRIEF HISTORICAL OUTLINE.

If a large atlas map of Australia is examined, the number of Dutch names appearing on the west of the continent is at once noticed, *e.g.* Cape Van Diemen, Houtman's Abrolhos, Dirk Hartog's Island, Cape Leeuwin (lioness). Tasmania was formerly known as Van Diemen's Land. Indeed, until the middle of the last century, Australia was commonly called New Holland, and it is very probable that if the Dutch sailors who first explored its coasts had seen the east coast, instead of the north coast with its mangrove swamps, or the desert west coast, the continent would still have borne that name. It appears as though the earliest Portuguese, Dutch and Spanish explorers, whose objective was the Spice Islands, missed the southern continent. In 1606, Torres, a Spaniard, discovered the straits which bear his name, but of greater importance were the discoveries of Tasman, who, in 1642, reached Tasmania, which he believed to be part of the mainland. It was not until over a century later, however, that the great Englishman, Captain Cook, discovered the fertile east coast. He had been engaged upon astronomical work in one of the Pacific Islands, and when that was completed he sailed westwards, and hitting upon New Zealand, whose west coast had been seen earlier by Tasman, circumnavigated both large islands, and continued his voyage westwards. He reached the Australian coast at Botany Bay, so called on account of its profuse vegetation. After sailing northwards along the coast of a land which he named New South Wales, he passed through Endeavour Strait (called after his boat), and returned to England. The first use to which the new land was put was as a convict settlement, which was formed at Botany Bay, but afterwards removed to the much superior inlet of Port Jackson. Here Sydney was built. By degrees the whole of the continent was unveiled. It is interesting to notice that it was not until about ten years after the first settlement was made at Sydney that Dr. Bass,

a surgeon in the Navy, discovered that Tasmania was separated from the mainland.

Other penal settlements were made at Hobart, in Tasmania, and at Brisbane, in Queensland. Settlements on the Swan River in West Australia, at Adelaide and at Melbourne soon followed, although these were by legitimate settlers who engaged in pastoral and farming occupations. Very gradually these six settlements and the regions around them attracted more and more people, so that finally they formed separate colonies. The discovery of gold at Bathurst in 1851, and later at Ballarat and Bendigo, led to a large increase in the population. In the end it was seen that if the continent was to attract the right kind of settlers the penal settlements must be broken up.

In 1901 the six states (five Australian and Tasmania) united to form the Commonwealth of Australia, although they still retained a large amount of local self-government. The difficulty of selecting a capital was got over by conferring the honour upon *Canberra*, a small township some one hundred and fifty miles south-west of Sydney.

The present population of Australia is about four and a half millions. Even when we take into consideration the tropical nature of the northern coastal belt and the desert character of enormous areas in the west, it is obvious that there are opportunities for a large increase of the population.

QUEENSLAND.

Queensland may be divided into the following natural regions:—

1. The hot coastal margins.
2. The eastern highlands.
3. The western plains, a savannah region to the lee of the eastern highlands, but gradually becoming more and more arid as the desert is approached.

1. On account of its position and climate the "White Australia" policy retards the development of Queensland more than any other state, especially in the first region—the coastal margins. After very careful consideration, the Australian Government has decided that a determined attempt must be made to keep the continent for whites; and their reasons are partly on the grounds of defence. The cultivated products suited to the coastal lands of Queensland and North Australia generally are sugar, cotton, rice, tropical fruits and other products of the Indian type. Now it is generally held that the climate of regions producing these commodities is not suitable for white labour, but in recent years medical opinion on the subject has somewhat changed, and it is now believed that many of those parts of the world popularly thought to be white men's graves, or to be unsuitable for white labourers, will be made safe owing to the great advance which has been made in the study of tropical diseases and medicines. If the development of the Australian tropical lands by whites is, after trial, proved to be a failure, there is no doubt that the whole question will be reconsidered. At present the area certainly does not produce up to anything like its capacity. Should the experiment prove a success it will be the first successful example of its kind in the world.

At present the alluvial plains of the first region of Queensland (see above) produce bananas, pineapples, sugar and rice; on the lower slopes of the hills a little cotton and coffee are grown, whilst the chief crop, maize, is found at higher elevations still.

2. In the second region mining is the leading occupation, although on the Darling Downs there are arable and pasture lands on which wheat is grown, and a large number of sheep and cattle are reared. The mineral wealth includes gold, copper, coal and tin. Gold is mined at *Charter's Towers*, some eighty miles west of Townsville, *Mount Morgan*, about thirty miles southwest of Rockhampton, and at *Gympie*, nearly one hundred miles north of Brisbane. Copper is also

mined at Mount Morgan. Large deposits of coal are known to exist, but, except at Ipswich, twenty-five miles south-west of Brisbane, are little mined owing to their distance from the coast.

3. Pastoral occupations are of greatest importance in the savannahs. Cattle and sheep are reared in large numbers, the former in the wetter, the latter in the drier parts. The whole of this region lies in the artesian well area, and nearly two thousand wells, yielding five hundred and thirty millions of gallons per day, are used principally for watering cattle and sheep.

The chief port and capital of Queensland, *Brisbane*, is situated about twenty miles from the mouth of the Brisbane river. It has not quite the same dominating part in the trade of its state as is possessed by the other capitals, partly on account of its position in the south-east corner, but also owing to the competition of other rising ports, which have good facilities for railway communication with their hinterlands (see Fig. 143). *Ipswich*, the chief coal centre, has cotton and woollen manufacturing industries. *Rockhampton* and *Townsville* are important ports from which railways run westwards, crossing all three of the natural regions, and bringing their products to the coast for export. All the ports of north-eastern Queensland benefit from the sheltering effect of the Great Barrier Reef.

NEW SOUTH WALES.

The natural regions of this state are physically very similar to those of Queensland. Owing to the latitude, however, the climatic and vegetation conditions belong to cooler types. The natural regions are—

1. The coastal belt.
2. The eastern highlands.
3. The western plains.

1. The coastal belt is in a much more advanced state of development than that of Queensland, and supports

a large population. Sugar is grown in the north, but the output is declining. Maize is largely grown, especially in the south; and it is worthy of note that although New South Wales is the chief maize-producing state, much has to be brought from Queensland to supply the demand for this valuable stock food. The coastal belt is more suitable for cattle than sheep, and it is



FIG. 143.—The chief railways. The “clocks” show Australian standard time. The line from Kalgoorlie to Adelaide is now completed.

on this account that dairy farming has become a very important industry. The coal-fields are near the coast, so that the coal can be exported very easily. The most important is the Hunter River coal-field, with the appropriately named town of *Newcastle* as its centre. More coal is got from this district than from any other in the southern hemisphere. South of Sydney there is another coal-field in the vicinity of Wallongong.

2. The tops of the eastern highlands resemble

plateaus, the eastern slopes are short and steep, and the slopes to the west are longer and more gradual. These physical conditions have a marked influence upon agriculture for large areas of the western slopes produce wheat and barley, while the plateau has a much smaller area of cultivated land, and oats and potatoes are equally important with wheat. There are splendid pastures in the highlands, and over one half of the cattle and nearly one half of the sheep of the state are grazed there.

Gold, copper, and tin are mined in many places. *Bathurst*, formerly one of the chief gold mining towns in Australia, is now more important as an agricultural and stock-rearing centre.

3. The third region is largely the basin of the Murray-Darling, and is a great stock-region. The western part is poorer than the east, on account of the more arid conditions, and the number of sheep decreases as we go westwards. It is also owing to the more favourable climatic conditions that the east is more important for wheat than the west. Great progress in agriculture has been made in the *Riverina*, the land between the Murray and the Murrumbidgee, although even here the rainfall must be supplemented by water from artesian wells. The western plains are not without mineral wealth. Copper is mined at Cobar and Silver at Broken Hill, near the borders of South Australia. The latter exports its silver from Port Pirie, a South Australian port on Spencer Gulf.

Sydney, the capital and chief port of New South Wales, is the oldest and largest town in Australia. It has a magnificent position on Port Jackson (see Fig. 144), an almost landlocked deep inlet with a narrow entrance. Since it has become the centre of the state's railway system it has greatly increased in importance, as will readily be seen from a list of its chief exports. They are wool, frozen and preserved meats, butter, hides and skins, leather, wheat and flour, gold, etc. It will be seen that these are representative of all the natural regions of the state. The great barriers to the

making of railways were the steep slopes and difficult valleys of the eastern scarps of the Blue Mountains. A winding road and a zigzag railway, and later a tunnel, overcame these difficulties and Sydney was connected by rail with Bathurst. Notice the line to *Bourke*, a great stock-rearing centre at the head of the navigation of the Darling, and also the branch to Cobar, the copper-mining town (see Fig. 143).



FIG. 144.—The position of Sydney.

VICTORIA.

Victoria, the smallest state in the Commonwealth, has the largest number of inhabitants per square mile, although this only amounts to fifteen. It may be divided into the following natural regions.

1. A north-western grassland.
2. An eastern highlands region.
3. A Mediterranean region.
4. A small eastern warm temperate belt.

1. The first region is devoted to sheep-rearing, except in those parts which have been cleared of mallee scrub and are now devoted to wheat-growing. Large sums have been spent upon this clearing work, and upon the construction of dams across the rivers in order to hold up water for use on the fields. This is necessary because Victoria is outside the artesian-well area. Despite the dry conditions which obtain in the north-western plains about nine-tenths of the wheat output of Victoria comes from there, especially from the irrigated *Wimmera* district, one of the areas formerly covered with mallee scrub. North of the *Wimmera*, the dry climate and the possibility of getting water from the *Murray* has led to the growth of a fruit industry with its centre at *Mildura*. All the Mediterranean products, such as the vine, olive, apricot, peach, orange, etc., do very well indeed. Raisins and canned fruits are largely exported.

2. In the highland belt, gold-mining is of prime importance, although pastoral occupations are important in the valleys. The chief mining centres are *Ballarat* and *Bendigo*, but in recent years the output has declined, and many of the miners have left for the richer West Australian mines. The wetter, southern slopes of the highlands are densely forested, and provide a source of wealth which has been very little exploited.

The third and fourth regions occupy the coast belt. To the north the highlands rise very abruptly, whilst in the south are the moderately high mountains to the east and west of Port Phillip, the harbour of Melbourne (see Fig. 145). Between the two systems lies a rift valley, the *Great Valley of Victoria*. Evidences of former volcanic activity are seen in the numerous extinct cones scattered about the surface of the western portions of the Great Valley, and the results of this are seen in the rich volcanic soils, and consequent greater productivity of the west compared with the east. The valley is largely devoted to stock-rearing and dairy-farming. Fruit-growing is spreading in the western half where the climate, which is of the "Mediterranean" type, is

very suitable for the industry. The eastern half is almost entirely pastoral.

The Gippsland and Otway highland areas are still largely covered by forests—due of course, to their heavier rainfall. Great progress in felling the trees is taking place, and on the cleared lands dairy-farming is meeting with success. Most of the farmers belong to the co-operative dairies which collect the milk, eggs, etc., manufacture the former into butter and cheese, and arrange for their export.

The capital of Victoria is *Melbourne*, which occupies



FIG. 145.—The position of Melbourne.

a magnificent position at the head of Port Phillip Bay. The latter almost cuts the Great Valley in two, so that all east and west routes must pass through Melbourne. Besides this, behind the city the highlands are narrowest and lowest, so that railways will cross there. Owing to these great advantages, Melbourne has nearly half of the population of Victoria, and exports the greater part of the state's products. *Geelong*, also on Port Phillip, is the second port, and is primarily engaged in the exportation of wool and wheat. The great production of wool has led to the establishment of woollen manufacturing in the town.

SOUTH AUSTRALIA AND NORTHERN TERRITORY.

South Australia and the Northern Territory may be divided into:—

1. A tropical monsoon coastal belt.
2. A belt of savannahs.
3. A large area of desert and semi-desert.
4. A Mediterranean coastal belt in the south.

Northern Territory.—This vast undeveloped area includes the first three regions. At the present time the leading occupations of the few settlers—there are less than 4,000—are cattle-rearing and gold-mining. In the wet coastal belt where the difficulties are those of the similar region in Queensland, *e.g.* lack of labour, some rice and hemp are grown.

South Australia.—The north of South Australia consists of desert lands of very little value, although it is believed that rich deposits of gold exist. As the south coast is approached the land becomes less arid, and there are scrub-covered tracts in parts of which sheep are reared. The “Mediterranean” regions comprise the narrow coastal margins in the west, and the land round Spencer and St. Vincent Gulfs in the east.

Most of the inhabitants of South Australia live in the land surrounding the Spencer and St. Vincent Gulfs, openings of very great value, since they give easy access to the best lands of the state. The climate is suitable for fruits, and many vineyards have been planted on the sunny northern slopes of the hills, whilst wheat is grown on the coastal plains surrounding the two gulfs. Copper is extensively mined and smelted at Moonta and Wallaroo in the York Peninsula, and silver from Broken Hill (New South Wales) is smelted at, and exported from, Port Pirie. East of the South Australian highlands, the land is chiefly given over to pastoral occupations, although in the south, owing to a heavier rainfall, dairy-farming is of greater importance.

Adelaide, the capital, is splendidly situated between the South Australian highlands and Spencer Gulf, about six miles from the latter. Its port is Port Adelaide. The city has not made such marked progress as the other Australian capitals, largely owing to the uncertain character of the rainfall and the effect of this upon the agricultural activities of the state, and to the comparatively inferior value of the mining industry. It is in direct communication by rail with Melbourne, and through that city with Sydney and Brisbane, and has thus developed as an important mail-packet station, because passengers and mails landed at Adelaide, or sent on by rail from Fremantle, can reach the eastern capitals before the boat on which they came.

Port Augustus, at the head of Spencer Gulf, is an important wheat port.

WEST AUSTRALIA.

West Australia, often called Westralia, may be divided into the following natural regions:—

1. A small area of hot, tropical, monsoon lands.
2. A savannah region.
3. A huge tract of desert and semi-desert.
4. A Mediterranean region.

From what we have already learned, it will be evident that the bulk of the people, who number less than a quarter of a million, live in the fourth region. White settlers are very few in the first region. The second region, although unsuitable for sheep, is the chief cattle-rearing part of the state. The valley of the Fitzroy is especially noted for this industry. The desert which reaches the coast on the west is of economic importance, owing to the rich gold-mines in the south-west and west. The most important of these are in the district of *Kalgoorlie* and *Coolgardie*. The former is the chief centre, and produces one-half of the total output of the state. It is worth noting that the Australian output of

gold is only exceeded by that of the Transvaal and of the United States, and also that West Australia produces over half of the total Australian output. Unfortunately, however, the output is diminishing.

The Mediterranean region contains the most valuable forests and agricultural lands. The former supply the famous karri and jarrah woods (see p. 524). Wheat is the most important cereal, and most of the Mediterranean fruits are also found. The coastal margins of the great Australian Bight, like the similar lands of South Australia, are only important for sheep-grazing. The small port of Eucla serves this region.

The capital is *Perth*, situated some twelve miles from the mouth of the Swan River. It has a very agreeable climate, although in summer the heat is often intense, and would sometimes be unbearable were it not for a cool, west sea-breeze, locally called the "Fremantle Doctor," which sets in in the early afternoon. *Fremantle*, its port, is the first Australian calling station of steamers approaching the continent via the Suez Canal and Colombo. From Perth railways run northward to *Geraldton*, the port for the Murchison gold-fields, southwards to *Bunbury*, a rising port with supplies of coal near at hand, and *Albany*, the chief south coast port and an important naval station; and eastwards to the Kalgoorlie gold-fields and beyond to Adelaide and the east coast.

The Australian Railways.—If we consider the Australian railway system as a whole, we see that it shows the partial development of the Commonwealth, and the effect of the desert interior. The state capitals are to a remarkable extent the centres of the railways of their respective states. Many lines, notably in the east, run from the coast through the productive belts, and bring their produce to the coast. The linking up of the various systems has been of considerable difficulty, especially as there is no common gauge. For example, in going from Adelaide to Sydney, the gauge is changed twice, for the South Australian, Victorian and New South Wales' gauges differ from each other.

TASMANIA.

Tasmania is an outlying portion of the Australian eastern highlands. It lies at all seasons in the track of

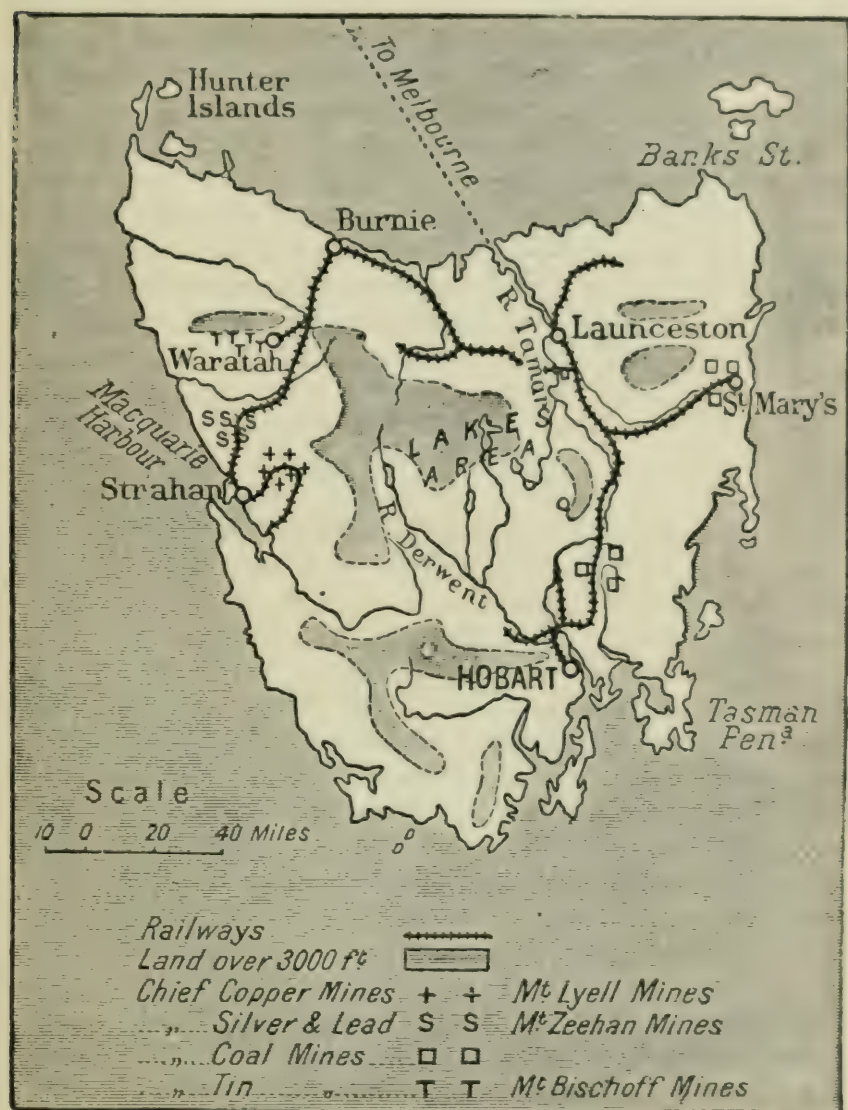


FIG. 146.—Tasmania.

the prevailing westerlies, so that it is well watered, especially in the west. The leading occupations are

agriculture, pastoral farming, and mining. Fruit-growing is extensively carried on in the drier south and south-east, and large quantities of fruit, especially apples, are exported. The drier parts of the island are also noted for sheep-rearing, whilst cattle are reared in most of the settled areas. Tasmania is rich in minerals, and copper, tin and lead are mined in considerable quantities, whilst gold and coal are also obtained (see Fig. 146).

The capital, *Hobart*, stands about twelve miles from the mouth of the Derwent, and has a climate very similar to that of the watering-places of south-western England. It is connected by rail with Launceston, the commercial centre, built on the estuary of the Tamar. Launceston owes its commercial importance to its nearness to Australian ports, especially Melbourne.

NEW GUINEA.

This large island is a detached portion of the continent of Australia, from which it is separated by very shallow seas. Its great length is due to lofty ranges of mountains which traverse the north and centre of the island from east to west. One range, the Owen Stanley, forms the narrow south-east peninsula. In the south there are extensive plains drained by the navigable Fly and other rivers. The interior of the island has been little explored, and much is quite unknown.

The position of New Guinea between the equator and 10° S. latitude ensures that the temperature is equable and in most parts very high. The rainfall is heavy in all parts. In the north the wettest season is during the southern summer, when monsoons are experienced. In the south most rain falls in the northern summer when the south-east Trades cross the equator to become the monsoon winds of south-east Asia. In each season the central mountains act as a barrier.

The effects of heat, rainfall, and altitude are seen in the vegetation, which is of the equatorial type in the

lowlands and lower mountain slopes, with open woodlands of the savannah type at higher levels. The native animals are marsupials like those of Australia, but the commonest domesticated animal is the pig.

The inhabitants, called Papuans, are akin to the negro, for their hair is black and woolly, often like a great mop, and their skins are very dark in colour. Many of them cultivate yams, taro, and sweet potatoes in forest clearings close to the villages, whilst those who live near the sea are often venturesome sailors and fishers. White settlers own extensive plantations in which coconuts, bananas, sugar and rubber are cultivated. The mineral wealth, which includes gold, is said to be abundant, but at present is little exploited.

Before the great European War, New Guinea was divided among the English, Dutch and Germans, but the German portion has been placed in the care of Australia by the League of Nations. Papua, the British part of the island, was already ruled by Australia. *Port Moresby*, the chief town, does most of the trade.

NEW ZEALAND.

The greater part of the Dominion, whose total area is rather more than five-sixths of the area of the British Isles, consists of North Island and South Island, separated from each other by Cook Strait. Besides North, South, and Stewart Islands, the Dominion includes the Auckland Islands, two hundred miles south of Stewart Island; Campbell Island south-east of the Aucklands; the Chatham Islands; the Antipodes Islands and Bounty Island, situated south and south-east of the South Island; the Kermadec Islands, north-east of North Islands; the Cook Islands, some two thousand miles north-east of the same island, whilst the former German part of the Samoan Group is administered by New Zealand under a mandate from the League of Nations.



FIG. 147.—New Zealand. Chief elements in structure.

PHYSICAL FEATURES.

The main trend of the mountain chains is from north-east to south-west (see Fig. 147). In South Island

we have the Southern Alps, whilst in North Island their continuations are seen in the ranges extending from Wellington to East Cape. Now notice Auckland peninsula of North Island and the highlands in the south of South Island. The "graining" of these older mountains is from north-west to south-east, *i. e.* at right angles to those mentioned above.

The uplift of the north-east to south-west ranges, which are newer, fold mountains, was accompanied by great volcanic activity and disturbances of the earth's crust, which have not yet ceased. Following the same north-east to south-west direction, extending from the Bay of Plenty to Mount Ruapehu, and bounded by great faults, there is an area of active, quiescent and extinct volcanoes, geysers and hot springs, which recalls the Yellowstone Park of U.S.A. In the south-west of North Island stands the magnificent extinct cone of Mount Egmont. In South Island there are two volcanic centres, the Banks and Otago Peninsulas, but no signs of present activity occur in either. Formerly, a land-mass extended eastwards from South Island, and when subsidences occurred these volcanic masses were built up along the borders of the sunken areas. Similarly Mount Egmont marks the point of intersection of two subsidences, the first of a former westward extension of New Zealand, and the second the subsidence which formed Cook Strait. Most volcanoes are found on the margins of sunken areas, where the fracturing and crumpling of the earth's crust cause weakness. That is why the eastern island chain of Asia is largely volcanic, and also why we often find volcanoes along the margins of rift valleys.

The plains of New Zealand are not extensive, but they are of very great importance. A large number of rivers rise in the western mountains of South Island, those flowing eastwards having a longer course than those flowing westwards. At the base of the mountains they have built up a series of great fans of *débris*, and, in the course of time, these have joined, and have formed continuous plains which are constantly being extended

farther and farther. In this way the broad Canterbury



FIG. 148.—New Zealand. Relief and rainfall.

plains on the east, and the narrow Westland plains on the west have been formed, whilst in the south the rivers

have spread *débris* over the surface of the peneplain of Otago (see Fig. 147). The strong currents flowing along the west coast prevent the accumulation of large deltas, and by the filling up of irregularities help to keep the coastline comparatively straight.

CLIMATE.

It is about nine hundred miles from the north of North Island to Stewart Island, and on account of this great distance we might expect the temperature differences between these extreme points to be very considerable. As a matter of fact the difference is only about 10° F. both in winter and summer. Of course the temperature is greatly influenced by altitude in the highland areas. Extensive areas of the southern Alps are permanently covered by snow, and some of the great glaciers descend to within a few hundred feet of sea-level. At Dunedin, in South Island, the mean annual variation of temperature is from 42° F. to 58° F. For Auckland, in North Island, the figures are 52° F. to 67° F., whilst the mean temperature for the whole of the country varies only from 48° F. in winter (July) to 63° F. in summer (January). On the whole we have in New Zealand the world's best example of the temperate maritime type of climate.

There are striking relations between maps of New Zealand showing relief and rainfall. These are brought out in Fig. 148 (see also Ex. 13 on p. 557). The seasonal distribution of the rainfall is important. In North Island, which lies in "Mediterranean" latitudes, most rain falls in autumn and winter, but there is no season when the rainfall is very slight, that is, there is no distinctly dry season. The South Island has, as its prevailing wind, the westerlies at all seasons, so that the rainfall is very evenly distributed throughout the year.

NATURAL VEGETATION AND ANIMALS.

Like Australia, New Zealand has long been separated from other lands, and the influence of this is seen in the large number of its plants—over two-thirds—which

are not found elsewhere. There is very little in common between the flora and fauna of New Zealand and of Australia, *e. g.* eucalyptus trees and kangaroos, opossums, etc., are not found. When white men first settled in this country, there were few animals, none of them large, and birds predominated.

Owing to the heavy rainfall, a large part of New Zealand is, or has been, forested. In the warmer North Island, the most valuable tree is the kauri, whose wood is exceedingly durable, and is most prized for house and ship building. This tree must not be confused with the karri eucalyptus of Australia. It is found chiefly in the Auckland province, but there are also areas where kauri forests formerly existed, and in these places large quantities of kauri gum, the fossil resin which exuded from the tree, is dug up and used for the making of ornaments, and in the manufacture of varnish.

The wet, west coast of South Island is densely forested, the prevailing trees being pines, especially the red and white varieties, although other cool temperate trees are also common. The timber of the white pine is largely made into butter boxes. In many parts of New Zealand there are gigantic tree ferns, which grow to a great height.

In the drier parts of both islands, particularly the Canterbury plains, grassland conditions prevail, although, as in Australia, the native grass, a wiry variety called "tussock," is not very suitable for food for cattle and sheep. As a consequence, it has been necessary to plough large areas and plant European grasses, in order to provide food for the immense numbers of cattle and sheep which the country now rears. Owing to the mildness of the climate, grass grows all the year round, so that the animals can be fed out of doors at all seasons.

One North Island plant of economic importance, a species of lily, *Phormium tenax*, commonly called New Zealand flax, deserves special mention. It is confined to the marshy areas. The fibre, despite the difficulty in preparation, is used like hemp in the manufacture of rope.

CHIEF OCCUPATIONS.

Pastoral and Agricultural Occupations.—The great importance of pastoral pursuits is seen in the fact that over three-fifths of the exports of New Zealand are animals and their products, wool itself forming nearly two-fifths of the whole export. Cattle are confined chiefly to the plains in the south of North Island, where butter-making is carried on, and to the lowlands of Otago and Southland in South Island, where cheese-making is important. Sheep are reared on the Canterbury plains, and on the east side of both islands generally. The occupations of freezing and exporting mutton and beef are very large and of increasing importance. Most of the by-products (bones and bone-ash, hair, hoofs, hides, horns, and much of the leather) are sent abroad, whilst what is left is converted into fertilizing materials, so that there is no waste.

Next to pastoral pursuits, agriculture employs most people. Wheat and oats are the principal crops, and do best in South Island. Temperate fruits grow very well, and splendid apples, plums and peaches are exported. Grapes and oranges are produced in the Auckland peninsula. Along the margins of the Bay of Plenty, maize is extensively grown, mainly by Maoris.

Mining and Manufacturing.—Coal and gold are the only important minerals—unless kauri gum be included. The chief coalfields are on the west coast of South Island, near Greymouth and Westport. Gold is mined principally in the north-west of South Island, near Greymouth, and in the Coromandel peninsula of North Island. Other minerals are known to exist in large quantities, especially iron, but at present little is mined. Practically the only manufacturing at present carried on is in connection with those articles which are naturally made on the spot, *e.g.* clothing, furniture, leather goods, etc., as well as the canning and preserving of fruits.

THE PEOPLE AND THEIR DISTRIBUTION.

The first European to see New Zealand was Tasman. This was in 1642, and it was not until a century and a

quarter later that the country was again visited, this time by Captain Cook, who made a remarkably accurate survey of the whole of the coastline. In the early part of the nineteenth century, the first missionaries and traders settled in the country, but serious attempts at colonization did not begin until 1840. In that year Wellington was founded, and a year later New Zealand became a separate colony from New South Wales. Settlement proceeded much faster in North than in South Island, where it did not begin on a large scale until after the discovery of gold in 1861. The greatest drawback to active colonization in both islands was the opposition of the natives, the Maoris. In the long series of wars between the early settlers and the Maoris, the numbers of the latter were reduced by more than half, from about 120,000 to less than 50,000. It is thought that the Maoris are the descendants of peoples who at different times, from six to four hundred years ago, worked gradually eastwards from the mainland of Asia, via the Malay peninsula and the East Indies and Pacific islands. The prevailing type has features very much like those of a European, except that the skin is light brown in colour. The hair is long, black, and wavy. These handsome natives are undoubtedly akin to Hindu races, but there are others whose straight hair and Mongolian features indicate that more than one race entered New Zealand. The capacity for education and the general ability of the Maori are seen in the fact that many of them practise as lawyers in the large towns, whilst four of their number have seats in the Dominion Parliament. They were very advanced before Europeans discovered the country, but they had no knowledge of metals, and consequently all their weapons and tools were made of stone. Their clothes were made largely of Phormium fibre (New Zealand flax), whilst wood was used in the construction of their wonderfully carved houses and large sea-going boats. Maoris are found in both North and South Islands, and their lands have been preserved to them. Many are the ground landlords of rising townships, and thus are wealthy citizens.

At the last census rather more than half of the people were in North Island, whilst three-tenths were in the four largest towns, Auckland, Wellington, Christchurch, and Dunedin. The great preponderance of Britishers is shown in the fact that nearly one-fourth of the people were born in the mother country, and 98·8 per cent. are British subjects. Indeed, New Zealand is a splendid example of successful colonization. The chief centres from which British colonization spread were Auckland, in North Island, and Christchurch and Dunedin in South Island. The settlement at Christchurch was distinctly English in character, as is illustrated by the large number of English names given to townships in the neighbourhood, *e.g.* Oxford, Sheffield, Lyttelton, Lincoln, etc. Dunedin and district was settled by Scottish Presbyterians in 1848, and Scottish influence is also seen in local names, *e.g.* Port Chalmers, Havelock, Roxburgh, Kelso, Dalhousie.

CHIEF CITIES.

Auckland is the chief port and largest city of the Dominion. It owes its importance to its situation on a very narrow neck of land, so that it has two harbours, that on the east side being the more important. *Wellington*, on an arm of Cook Strait, enjoys a position on the great shipway between the islands, and has thus become an important port of call, as well as the natural meeting-place of much of the coastal traffic of both islands. On this account it transacts a great deal of the country's overseas trade. Its central site has led to its selection as the Dominion capital, in place of Auckland. *Christchurch*, the largest city in South Island, stands on the river Avon, eight miles from its port. Its growth has coincided with that of the Canterbury Plains, which are its hinterland. *Dunedin* is the outlet for the produce of the Otago peneplain. Its harbour for large vessels is at Port Chalmers. *Invercargill*, on Foveaux Strait, is the chief port of southern New Zealand. Its exports are mostly "pastoral" in type, although it has a large trade in timber.

THE PACIFIC ISLANDS.

The Pacific Ocean covers more than one-third of the surface of the globe. It is almost surrounded by the west coast of the Americas, the east coast of Asia, New Guinea, Australia, and New Zealand (see Fig. 149). Notice how the deepest parts are often along the margins of the belt of volcanic islands, as, for example, to the east of Japan. Observe, also, that the ocean as a whole is a huge, deep basin, whose average depth has been computed to be about two and a half miles. West of the Philippines, a sounding of 5,348 fathoms has been made. Compare this with the height of Mount Everest, 29,002 ft. Other features of the Pacific are the isolated plateaus and small ridges which rise above the general level of the ocean floor, and on which stand many of the groups of islands we shall now consider.

The islands of the Pacific are innumerable. In groups, in lines, or singly, from the south-east Asiatic and east Australian coasts, in a belt on each side of the equator, they extend like stepping-stones two-thirds of the way to America. If we omit New Caledonia, which is built up of ordinary sedimentary rocks, and is believed to be a fragment of a larger Australian continent, we can divide practically the whole of the remainder into two classes; firstly, those which are volcanic, and secondly, those built of coral. Frequently the two types are referred to as "high" and "low" islands respectively.

Coral Islands.—The conditions favourable to the growth of coral polyps are as follow:—*Firstly*, the surface temperature of the water in which they build must not fall more than one or two degrees below 70° F.; this means that coral islands and reefs will be confined mainly to low latitudes, *i. e.* between about 30° N. and S., and also the east coasts of continents in these latitudes (see Fig. 12). *Secondly*, these tiny animals cannot live where there is any sediment, so that they are not

found at the mouth of a river which brings down silt, or where sand is present. *Thirdly*, they cannot live in fresh water because it does not contain the necessary food and mineral constituents; and *lastly*, they cannot build freely below a depth much exceeding 30 fathoms.



FIG. 149.—The Pacific Ocean.

Charles Darwin, the great scientist, explained the formation of a coral island as follows: A rock mass, perhaps of volcanic origin, lifts its head above the level of the sea, forming an island. Provided the conditions already stated are satisfied, coral polyps will build a fringing reef. The sinking of the rock (or of a large land-mass in the case of the Australian Barrier Reef)

causes the formation of a barrier reef, since there is now a lagoon between the reef and the diminished island. Meanwhile, the coral reef is built upwards to the level of the water. Further sinking will cause the island to disappear, and this results in the formation of an atoll, one of "those extraordinary rings of land which rise out of the depths of the ocean." This explanation is not accepted by all, and certainly cannot account for those islands resting on bases which have either not sunk at all, or have actually been uplifted.

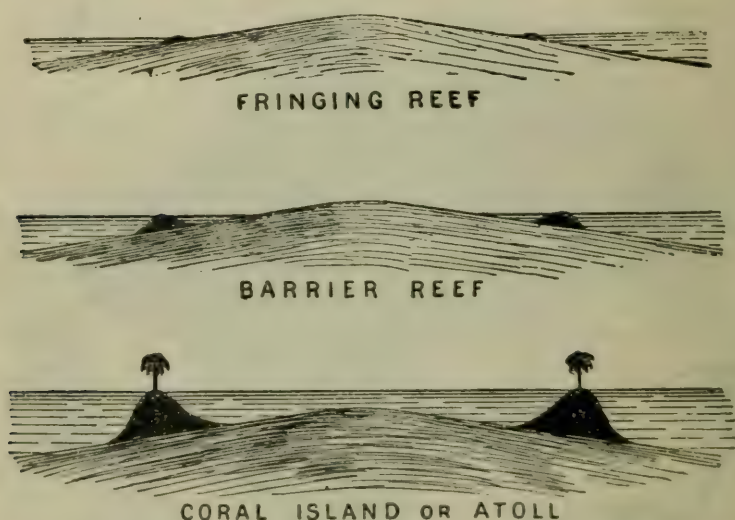


FIG. 150.—Sections illustrating the formation of a coral island.

Other scientists have sought for other theories. Murray suggests that, given submerged mountains or plateaus coming sufficiently near the surface of the sea, coral polyps will make reefs by building upwards. It is very possible that some islands have been made by one method, and others by the other, but whether *all* have been made by one or the other is uncertain. One point is certain, and that is, that corals themselves do not accomplish the whole of the task, for the shells of other sea inhabitants and the limestone secreted by organisms other than coral polyps also form a considerable portion of these interesting islands.

CLIMATE AND PRODUCTIONS.

The climate of the Pacific Islands is hot and equable. The rainfall is usually distributed throughout the year, although the particular month or months at which most rain falls is dependent upon the migration of the rain belts following the sun.

Owing to the more varied relief and soil, and to the greater fertility of the latter, the "high" volcanic islands have a wider range of products than the coral islands. Their cultivated plants include coconuts, yams, taro, bread-fruits, and bananas. These form the chief articles of food. Yams and taro are edible tuber roots; bread-fruit, which grows on a tree, is about the size of a pineapple, and must be cooked before it is suitable for food. In many of the "high" islands, Europeans have introduced plantations of sugar, rice, coffee, cotton, tobacco, etc., and these are meeting with considerable success, but the natives show some disinclination to add rice to their diet, which is unfortunate, because the articles of food mentioned above cannot support a vigorous native population.

In the coral islands the food supply is particularly poor. The coconut is all-important, and forms with pandanus fruit and fish the chief food. Pandanus fruit resembles a huge raspberry about seven inches in diameter, and each seed is like a shaving-brush dipped in cold cream and sugar. The inhabitants of the fertile "high" islands despise it, but in many of the poor "low" islands it is a luxury. Surplus coconuts are dried and exported as copra, the chief export of the Pacific Islands. It is used in the manufacture of soap and oil.

POLITICAL DIVISIONS AND CHIEF ISLANDS.

The Ladrões, Caroline, Marshall, Bismarck and Samoan Islands (except Guam, in the Ladrões, and the eastern islands of Samoa, which belong to the United States) were formerly German, but are now ruled by different Allied Powers under Mandates from the League

of Nations. German Samoa is ruled by New Zealand, the isolated island of Nauru by the British Empire, the two German islands of the Solomon group by Australia, and all the rest by Japan. The island of Nauru is believed to contain the richest phosphate deposits in the world. The United States also owns the Hawaiian Islands. New Caledonia, the Loyalty, Society, and Marquesas islands, together with the Low Archipelago or Paumotu islands, are ruled by France. The British and French jointly control the New Hebrides, whilst all the remainder are British.

We will now consider very briefly a few of the more important islands.

New Caledonia.—This mountainous though not volcanic island supports only about fifty thousand people, of whom nearly six thousand are of convict origin, due to its former use by the French as a penal settlement. The island is very rich in minerals, especially in nickel, cobalt and chrome ores, but the ancient rocks which form the highlands do not yield a fertile soil, and on this account one half of the total area cannot be cultivated. All the products of "high" islands are found. The rearing of cattle and sheep is also important. The capital and chief port is *Noumea*.

The Fiji Islands.—The total area of this volcanic group is about that of New Caledonia, but the population numbers about one hundred and fifty thousand. Like the other "high" islands they are forested, and have a varied list of productions. Of the plantation products, most space is devoted to coconuts, sugar-cane, rice and bananas. The capital of the group is *Suva* on the south coast of Viti Levu, the largest island. It is a very important calling station for vessels journeying between Australia, New Zealand and the west coast of North America. A glance at the map is sufficient to show the great importance of the position of the group from this standpoint. It is worth remembering that the line of longitude 180° E. and W. runs through the Fiji Islands. For the purposes of time, the International Date Line so runs as to give the islands the

same day as Australia and New Zealand. The same applies to Samoa.

The Samoan Islands.—The products are similar to those of other “high” islands. *Apia*, on the north coast of Upolu, is the chief port. Notice that its harbour is on the sheltered, leeward side of the island.

The Hawaiian or Sandwich Islands.—The group, whose largest island, Hawaii, is rather more than half the size of Wales, belongs to the “high” islands, and its climate and products are similar to those of the islands already mentioned. Rice, sugar and pineapples are especially important. The whole island of Hawaii is really a gigantic volcano, the greatest in the world, rising about 14,000 ft. above the level of the sea, and 30,000 ft. from the ocean floor. It has two great volcanoes, Manua Loa and Manua Kea. The latter is believed to be extinct. The “caldera” crater of Manua Loa is between two and three miles in diameter, but that of Kilauea, on its flanks, is better known.

The Hawaiian Islands are of great importance as a calling station for steamships. They lie on the Trade Routes between the Panama Canal and North America on the one hand, and Australia and Asia on the other. The native inhabitants, who are Polynesians, are outnumbered by Japanese, who form three-sevenths of the people, the majority of the remainder being Portuguese and Chinese. The capital is *Honolulu*.

THE PEOPLE OF THE PACIFIC ISLANDS.

The Pacific Islands may be divided into two great groups, the *Melanesian*, so called on account of the almost black colour of the skins of the inhabitants, and the *Polynesian*. These names have also been given to the people. The line of longitude 180° E. and W. roughly divides the two groups, although New Zealand should be taken with Polynesia. The Fiji Islands stand at the meeting-place of both groups, a fact which accounts for its mixed population, although Melanesian elements predominate. The Melanesians are, in the main, like the people of New Guinea, the

Papuans. They are dark and frizzy-haired, and form a very striking contrast to the taller, light-brown coloured, wavy-haired Polynesians, of whom the Maoris of New Zealand are the best example.

We will conclude by some references to the future of the Pacific Islands. First, as to the people. Contact with white men cannot leave them as they were before. On the one hand, missionary societies have done a very great deal of educational work for their uplift. It is almost incredible to think that it is not very long since a Fijian native king had a small club put in his hand when only seven years of age, and that his task for the day was to kill another boy. This king, Cakoban, died a sincere Christian. On the other hand, new diseases, new drinking habits, and alien customs have been acquired from traders and others, and these have helped to reduce the number of natives. Whether as a whole they will be improved by the work of missions and by wise government measures aimed at improving their status, whether they will become pawns in rival commercial enterprise, or whether they will be degraded by drink and debauchery, as unhappily many have been already, remains to be seen. As to the islands themselves, it would appear that those in the neighbourhood of Australia and New Zealand and other large centres of population will become more and more gardens supplying the demand for tropical fruits and products. This change will not be without its difficulties, since it means the introduction of Asiatic labourers. Many of the smaller islands, even if unfit for agricultural or other development, may be used as cable and wireless telegraphy stations, a use to which a few are already put.

EXERCISES.

1. Describe the relief of Australia, and illustrate your answer by a map on which the physical units are clearly brought out and marked.

2. Take any three natural regions of Australia and describe their leading contrasts. What regions in Asia may be compared with them? Give reasons for your comparisons.

3.

Town.	Elevation in Feet.	Mean Jan. Temperature.	Mean July Temperature.	Mean Annual Rainfall in inches.
A	15	76° F.	55° F.	33 (chiefly in winter)
B	20	84	75	63 (chiefly summer)
C	700	85	68	28 (chiefly summer)
D	587	86	52	11 (chiefly summer)
E	45	71	49	48 (at all seasons, most March-July)
F	37	61	47	23 (all seasons)

The above figures illustrate the climatic conditions which obtain at six Australian towns. Identify each town, or state its region, and give full reasons for your choice.

4. What will be the approximate height of the sun at Rockhampton: (a) at the equinoxes; (b) at the solstices?

5. State the geographical or other factors which have led to the growth and importance of Sydney, Melbourne, and Adelaide. Draw sketch maps to illustrate your answer.

6. What is meant by the policy of "White Australia"? What is your opinion about it?

7. Account for the cool wind known in Perth as the "Fremantle Doctor." Draw a diagram to illustrate your answer.

8. New Zealand takes Standard Time from the meridian $172\frac{1}{2}^{\circ}$ E. What does this mean? When it is 6 P.M. Thursday in London in winter, what time is it in New Zealand?

9. State as many contrasts as possible between North and South Islands of New Zealand.

10. A ship from London arrives at Wellington in November, and discharges her cargo. She is then reloaded with goods for transit to London. Name about six articles which you would expect to be included in both cargoes.

11. Study maps showing the depths of the oceans, and write a short account of the leading differences between the relief of the bed of the Atlantic and that of the Pacific.

12. "The Pacific Islands may be divided into two groups, the 'high' and the 'low' islands." Explain these names.

13. Fig. 148 shows the rainfall of New Zealand marked on a relief map. What are the prevailing winds? Why does the distribution of rainfall in South Island differ from that in North Island? Account (a) for the dryness of the Canterbury Plains, (b) for the heavy rainfall of the Banks and Otago peninsulas.

14. Compare and contrast Australia with those parts of South America and Africa which lie within the same latitudes.

15. Write a short summary of the chief voyages of discovery which have helped to unveil Australia and the Pacific Islands.

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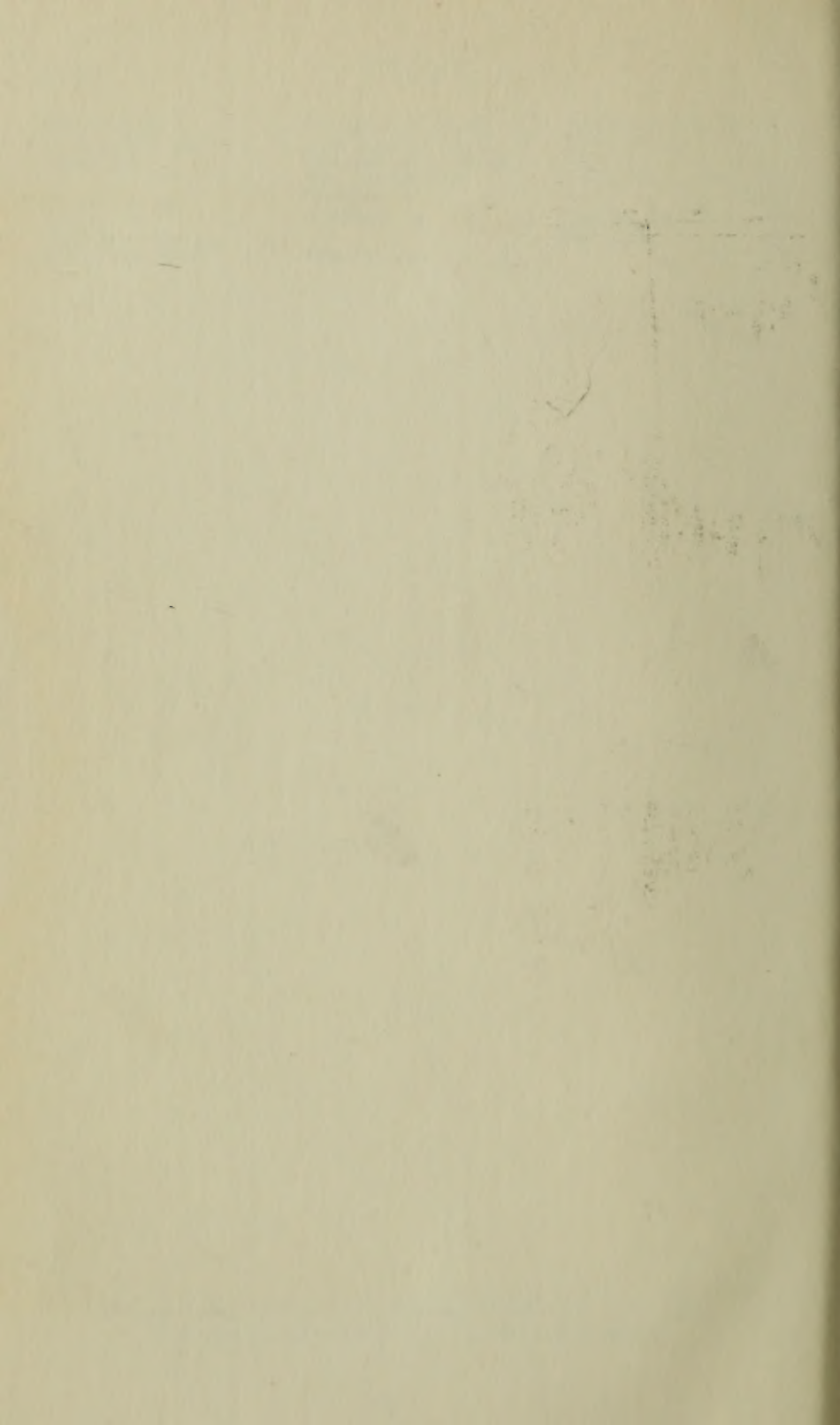
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